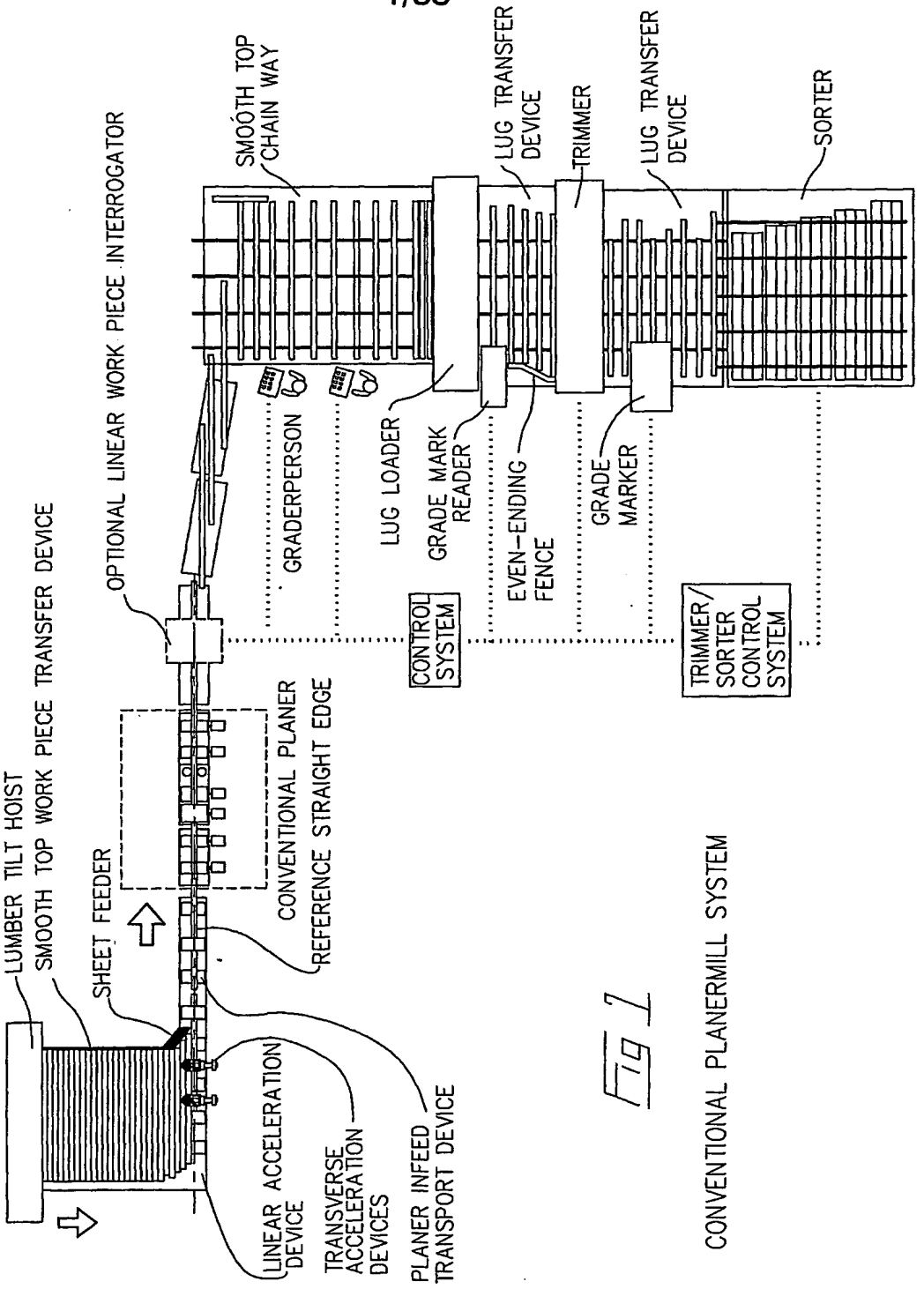
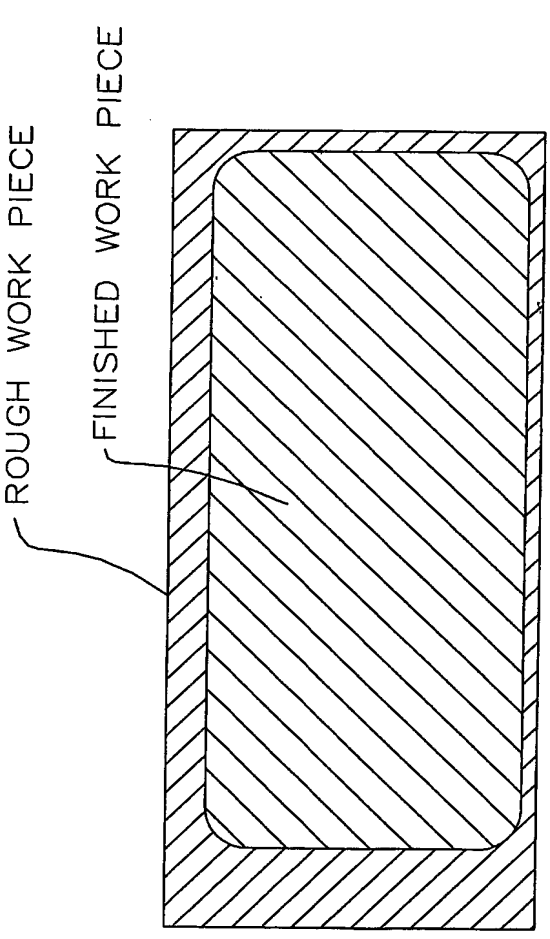


Fig 1

CONVENTIONAL PLANERMILL SYSTEM



FINISHED WORK PIECE SHOWN WITHIN A ROUGH WORK PIECE

Fig 2

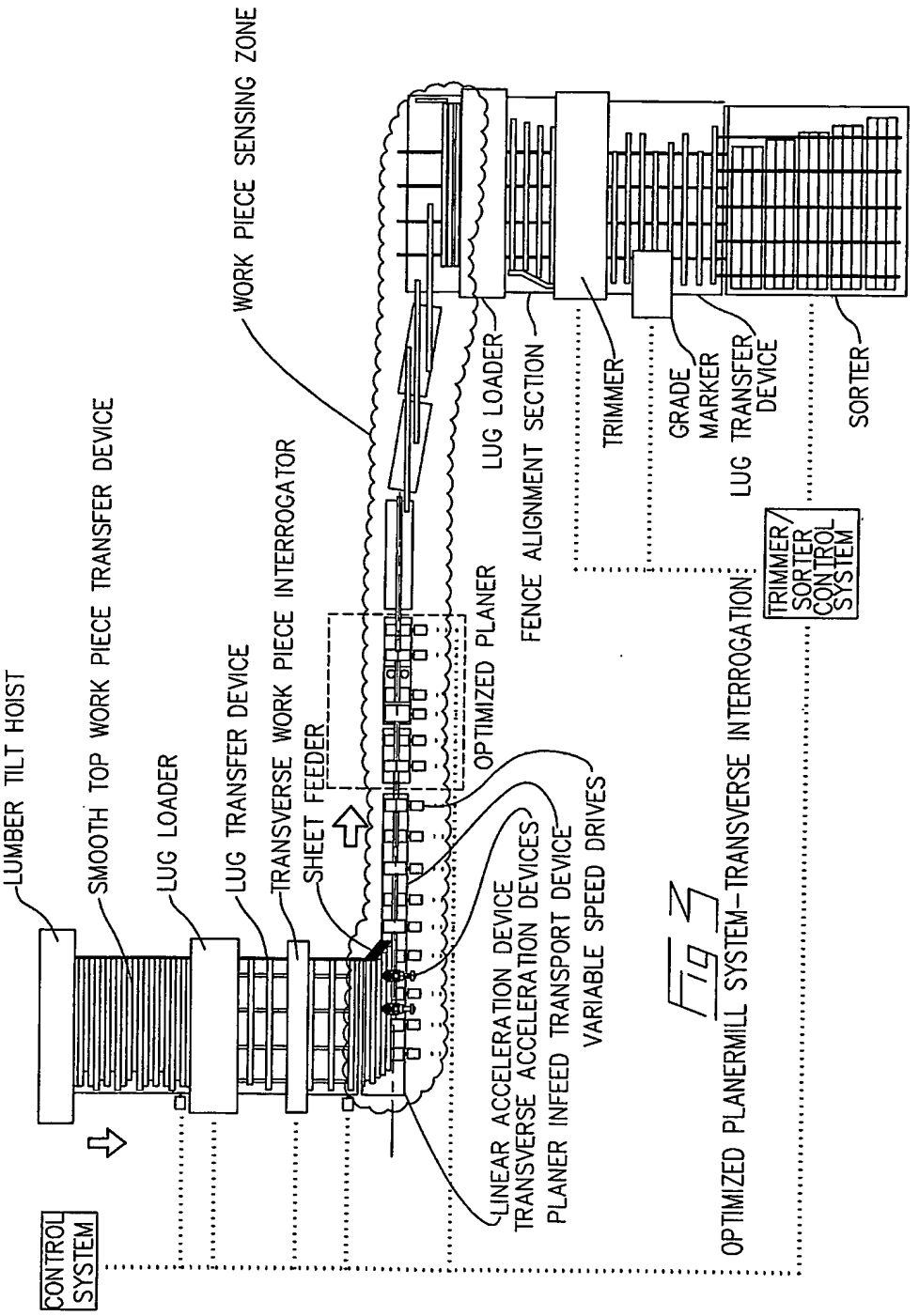

LUMBER TILT HOIST
SMOOTH TOP WORK PIECE TRANSFER DEVICE
LUG LOADER
LUG TRANSFER DEVICE
TRANSVERSE WORK PIECE INTERROGATOR
SHEET FEEDER
WORK PIECE SENSING ZONE
OPTIMIZED PLANER
LUG LOADER
FENCE ALIGNMENT SECTION
TRIMMER
GRADE MARKER
LUG TRANSFER DEVICE
SORTER
TRIMMER/ SORTER CONTROL SYSTEM
LINEAR ACCELERATION DEVICE
TRANSVERSE ACCELERATION DEVICES
PLANER INFEED TRANSPORT DEVICE
VARIABLE SPEED DRIVES
CONTROL SYSTEM
OPTIMIZED PLANERMILL SYSTEM–TRANSVERSE INTERROGATION

Fig 3

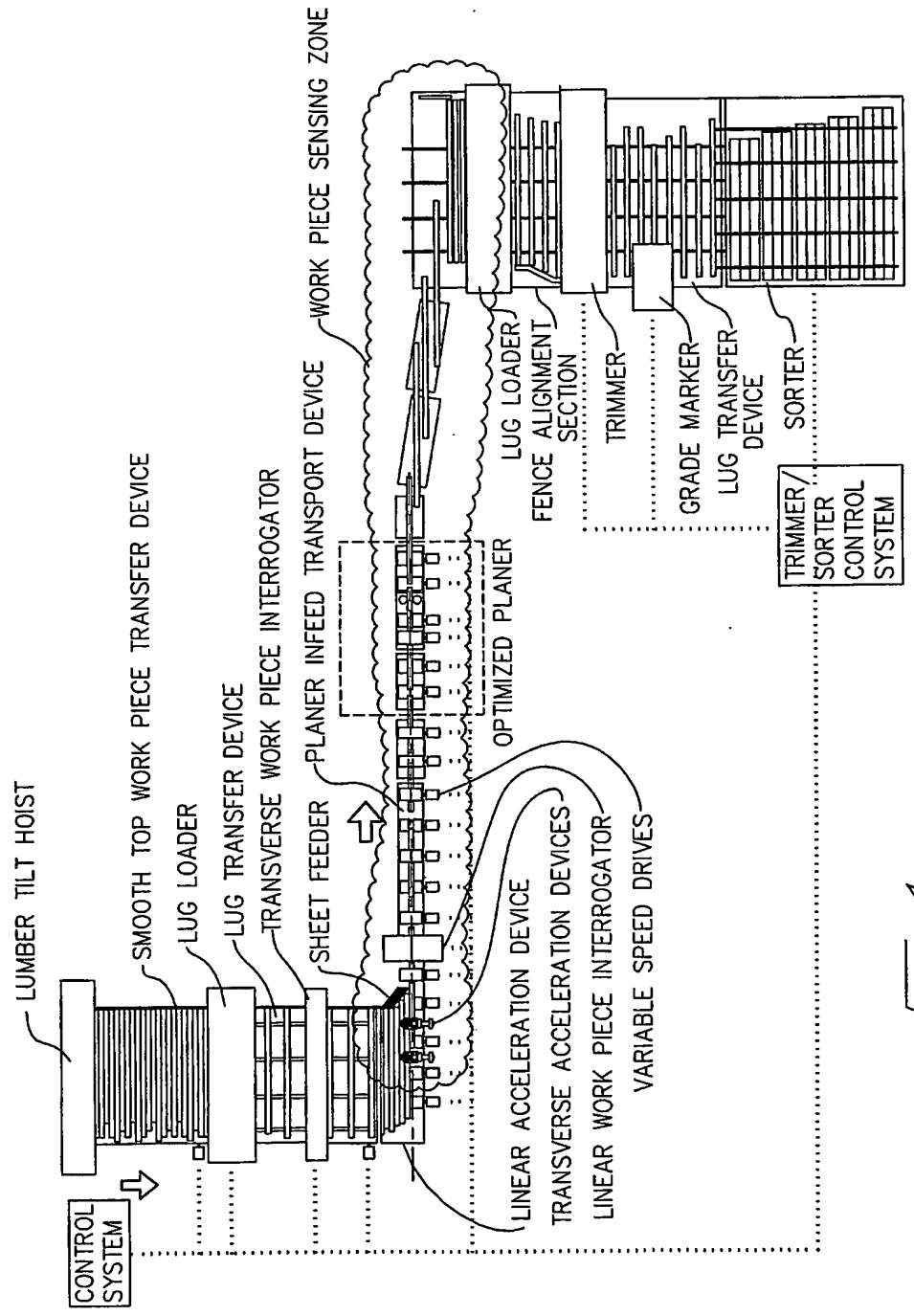


Fig 4
OPTIMIZED PLANERMILL SYSTEM-TRANSVERSE AND LINEAR INTERROGATION

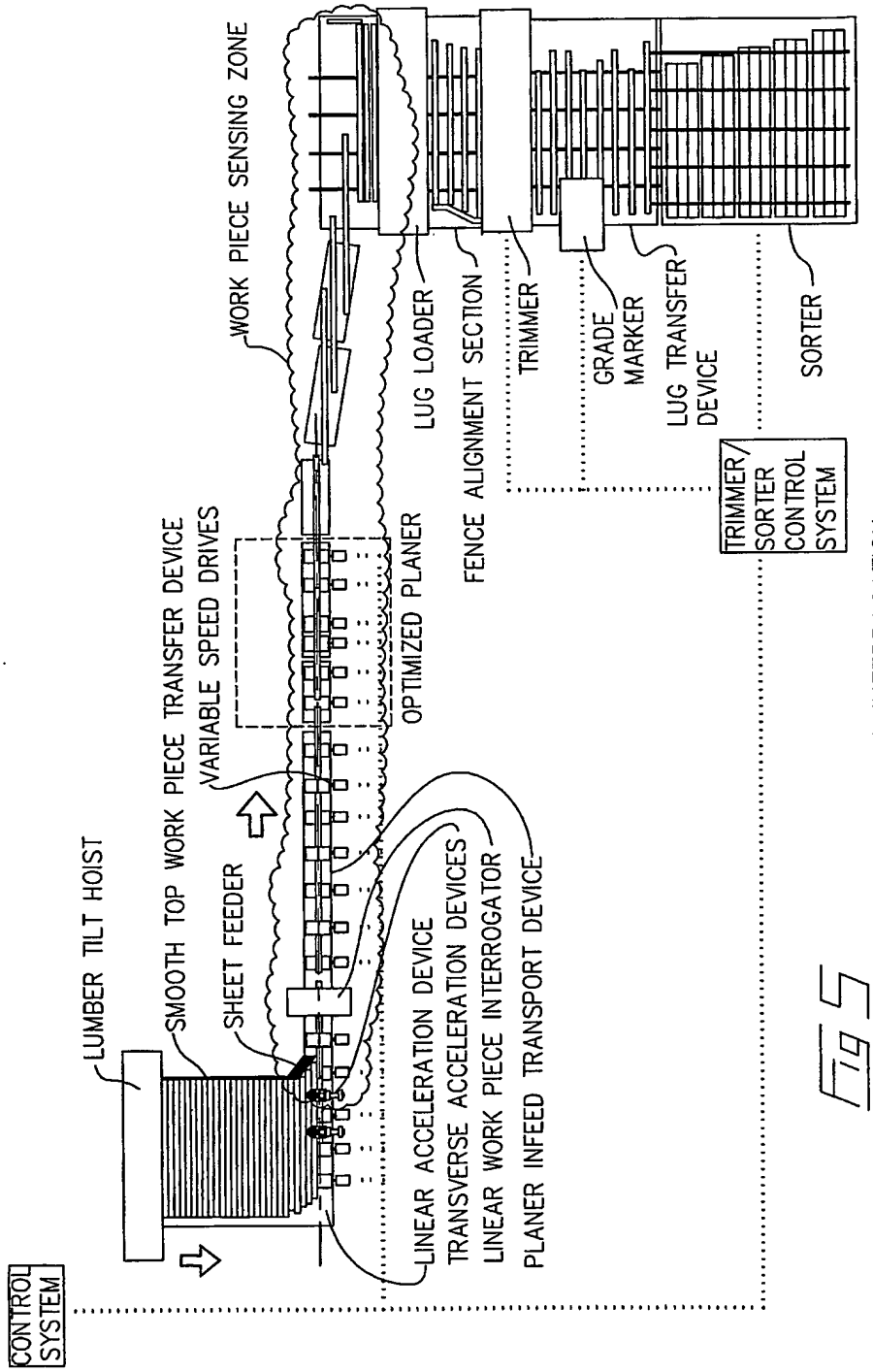


Fig 5

OPTIMIZED PLANERMILL SYSTEM–LINEAR INTERROGATION

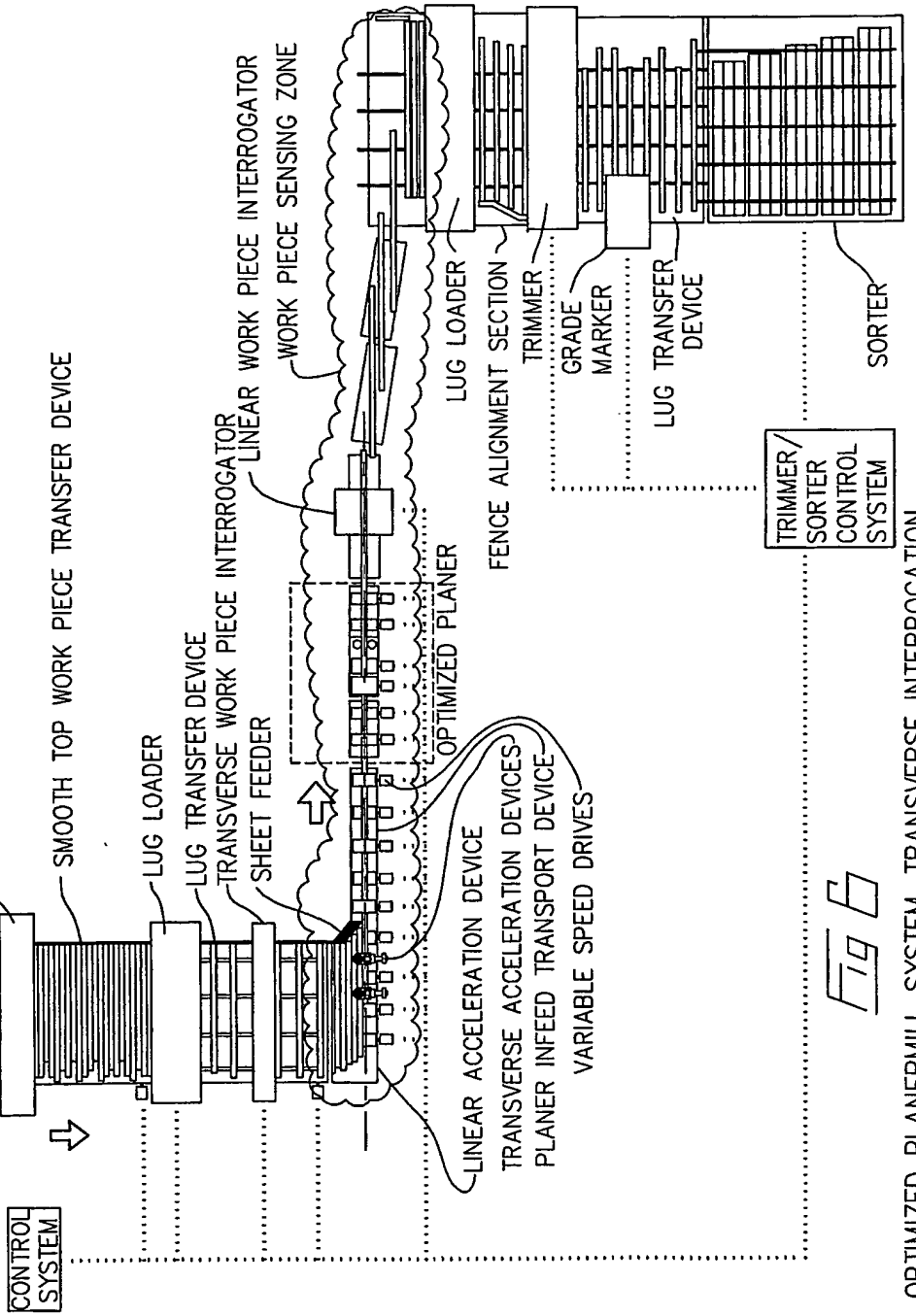


Fig 6

OPTIMIZED PLANERMILL SYSTEM–TRANSVERSE INTERROGATION
(WITH POST PLANER INTERROGATION)

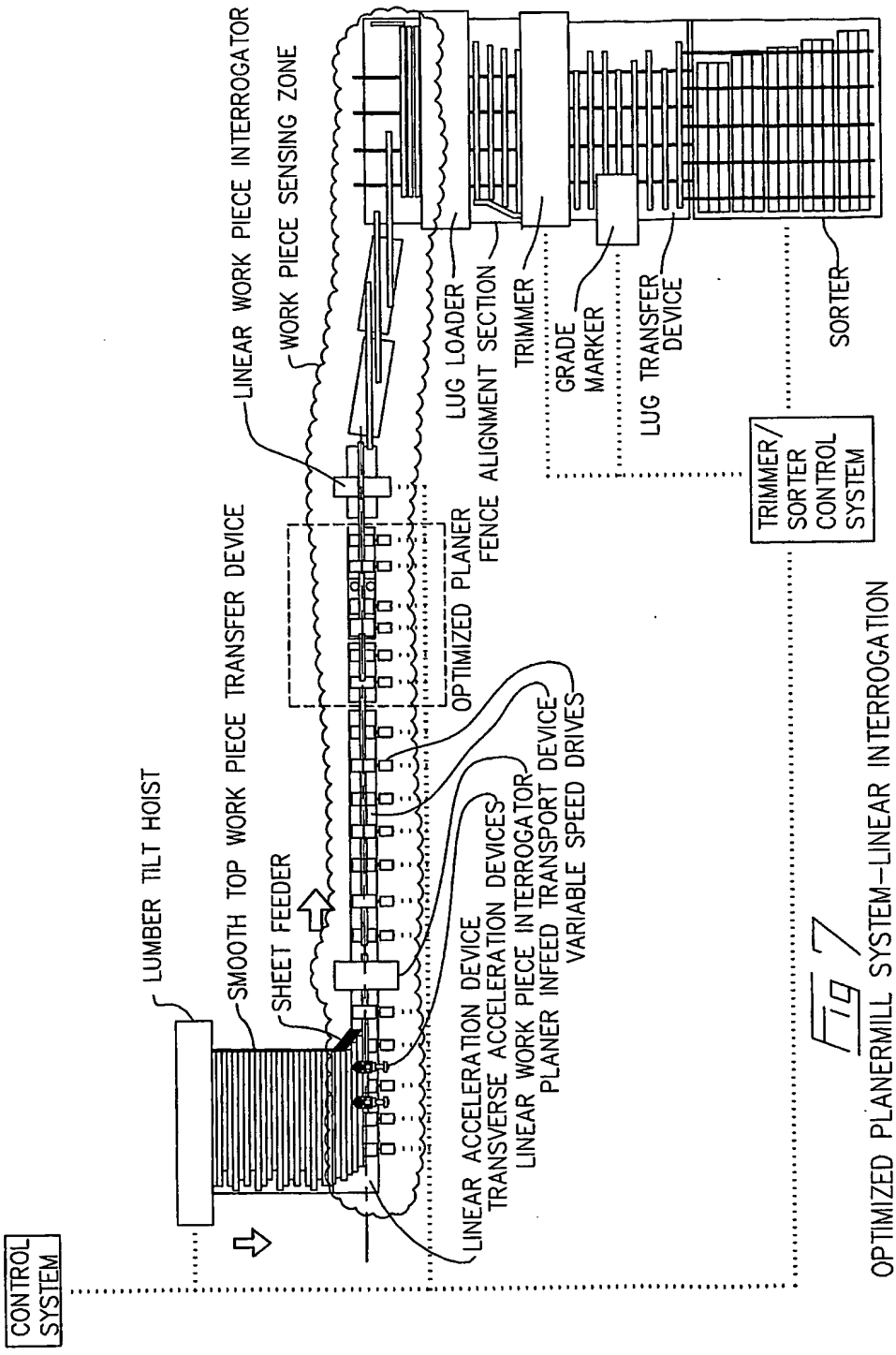


Fig 7

OPTIMIZED PLANERMILL SYSTEM–LINEAR INTERROGATION (WITH POST PLANER INTERROGATION)

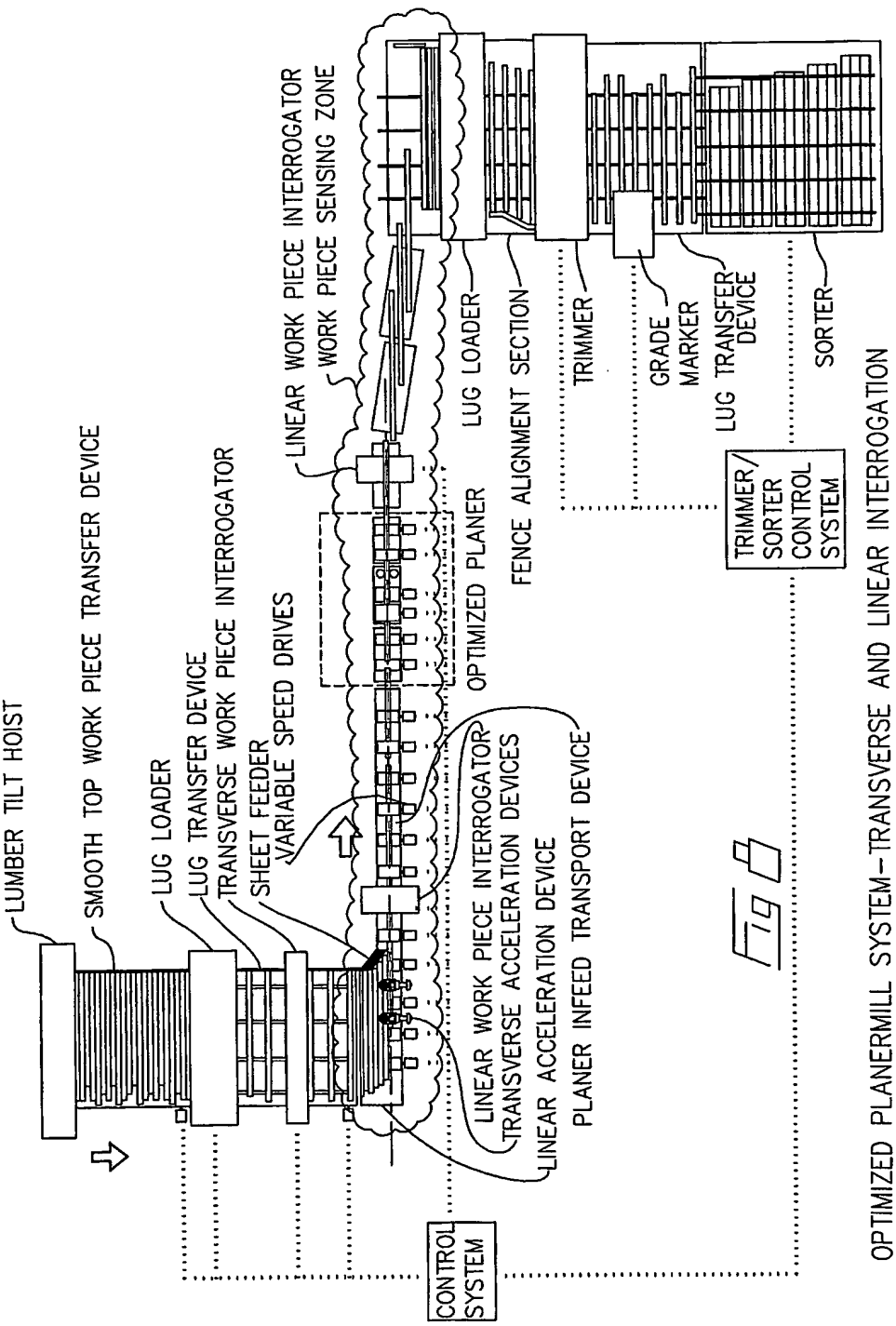

LUMBER TILT HOIST
SMOOTH TOP WORK PIECE TRANSFER DEVICE
LUG LOADER
LUG TRANSFER DEVICE
TRANSVERSE WORK PIECE INTERROGATOR
SHEET FEEDER
VARIABLE SPEED DRIVES
LINEAR WORK PIECE INTERROGATOR
WORK PIECE SENSING ZONE
OPTIMIZED PLANER
LUG LOADER
FENCE ALIGNMENT SECTION
TRIMMER
GRADE MARKER
LUG TRANSFER DEVICE
SORTER
TRIMMER/ SORTER CONTROL SYSTEM
LINEAR WORK PIECE INTERROGATOR
TRANSVERSE ACCELERATION DEVICES
LINEAR ACCELERATION DEVICE
PLANER INFEED TRANSPORT DEVICE
CONTROL SYSTEM
OPTIMIZED PLANERMILL SYSTEM–TRANSVERSE AND LINEAR INTERROGATION
(WITH POST PLANER INTERROGATION)

Fig 8

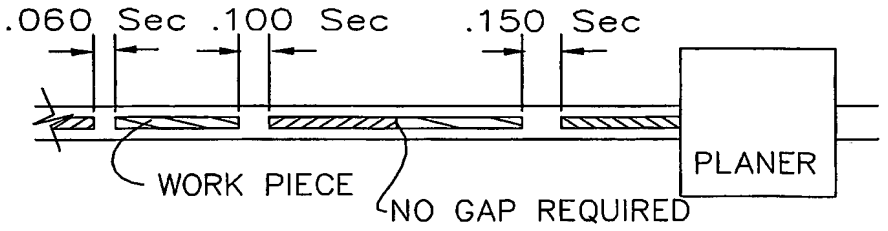


Fig 9

SIMPLIFIED EXAMPLE OF FULLY OPTIMIZED GAP CONTROL

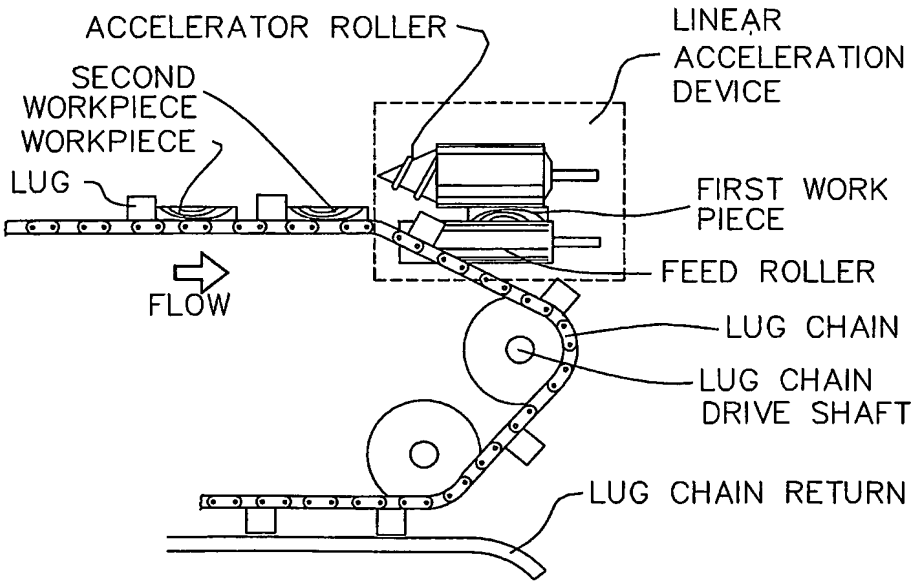


Fig 10

LUG TRANSFER DEVICE FEEDING WORKPIECES WITH A LINEAR ACCELERATION DEVICE

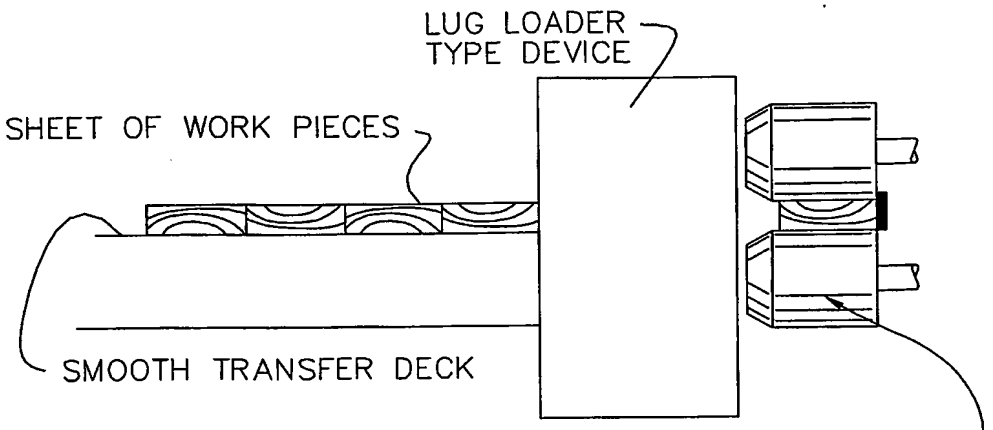


Fig 11

LUG LOADER TYPE DEVICE SHEET FEEDER

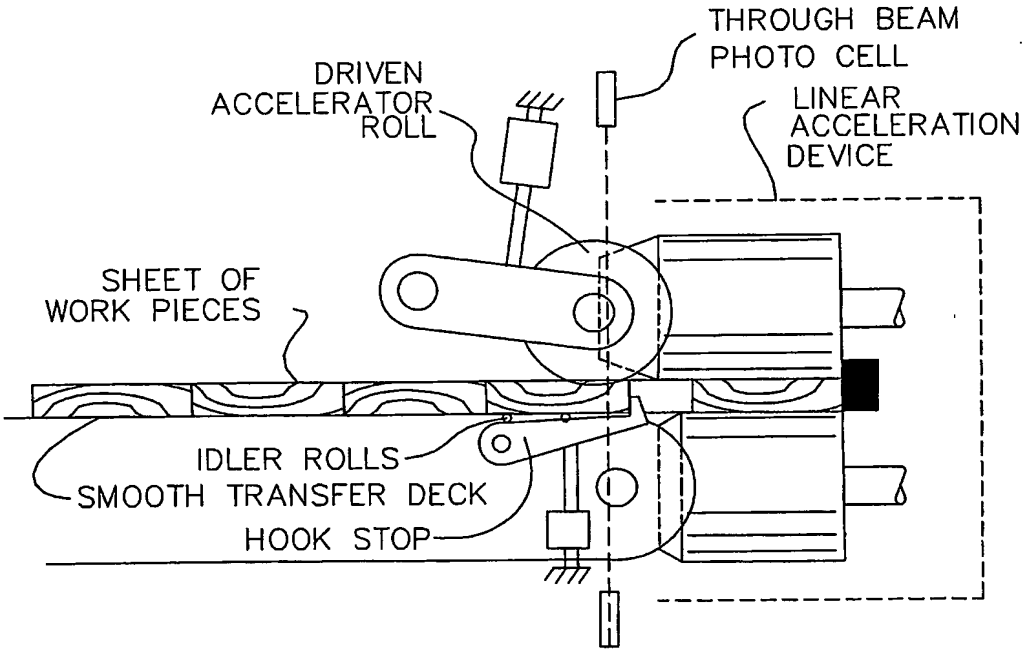


Fig 12

SHEET FEEDER

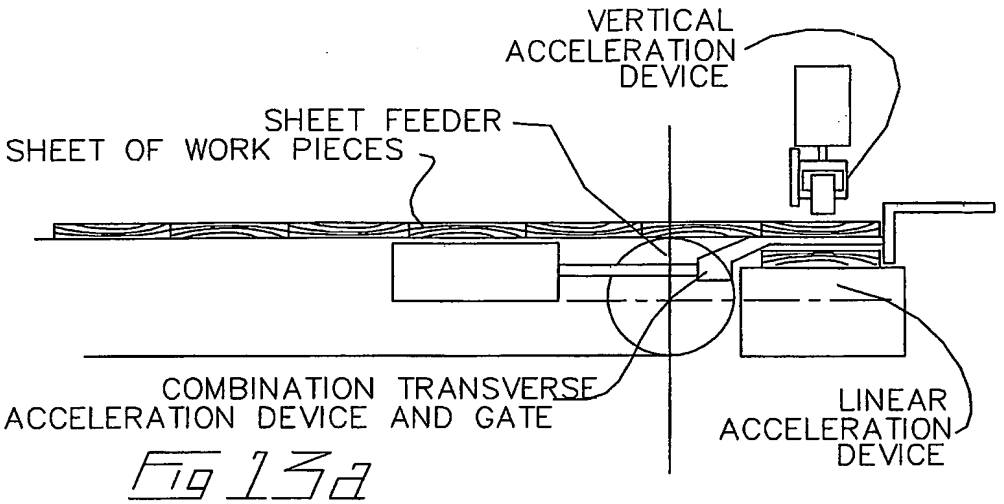


Fig 13a

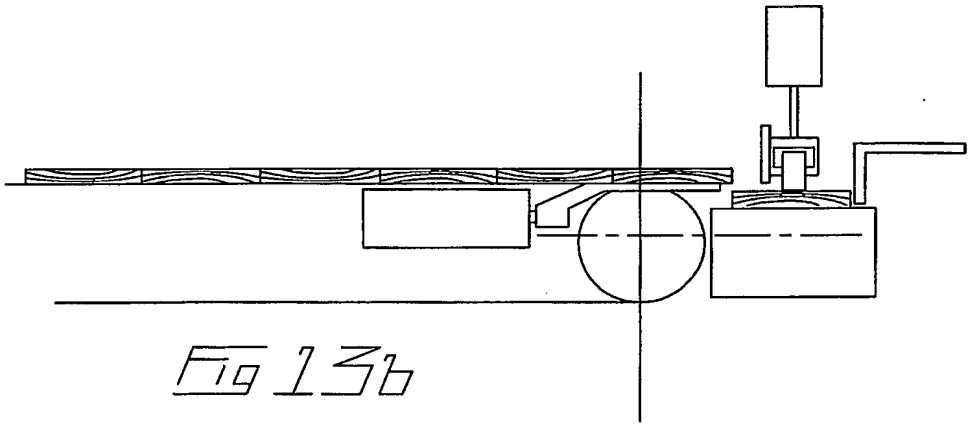


Fig 13b

SHEET FED TRANSVERSE ACCELERATION DEVICE COMBINED WITH VERTICAL ACCELERATION DEVICE AND LINEAR ACCELERATION DEVICE

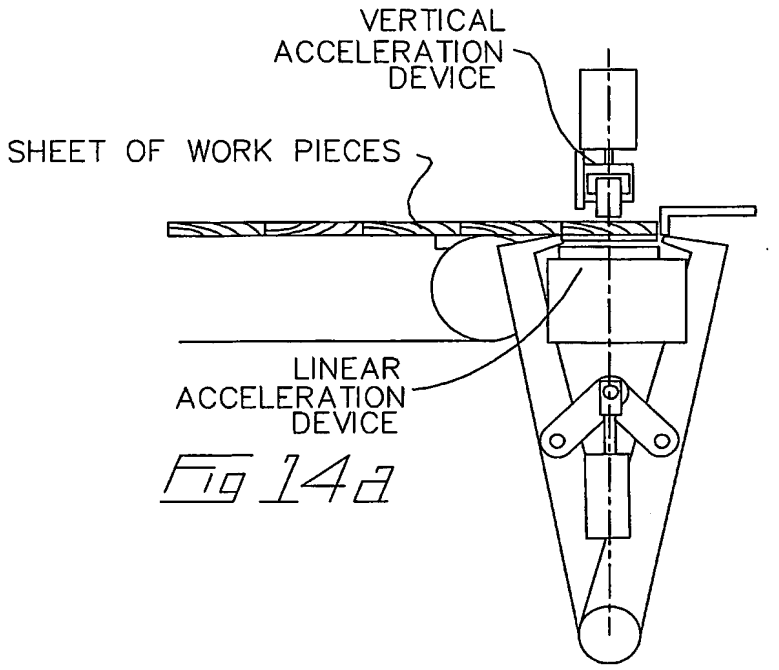


Fig 14a

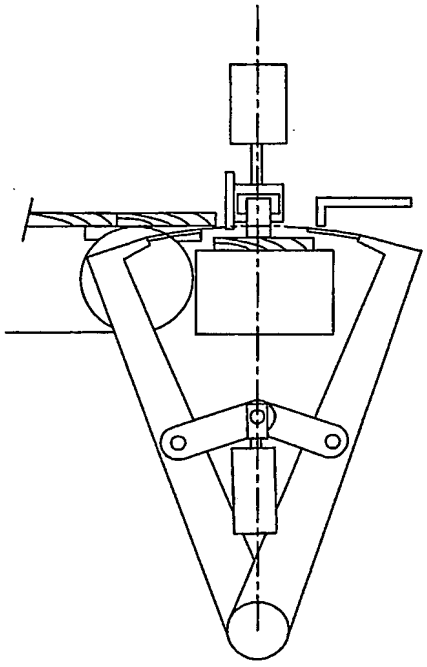


Fig 14b

ALTERNATE SHEET FED VERTICAL ACCELERATION

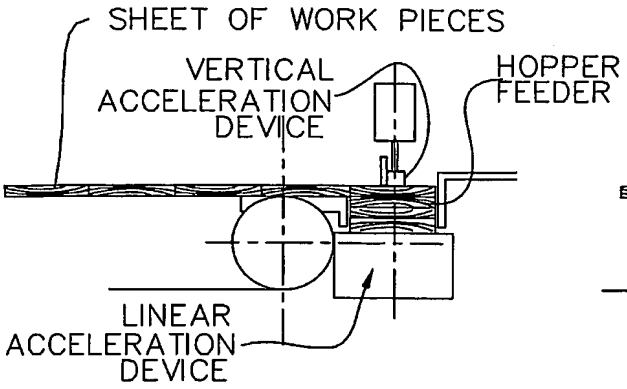


Fig 15a

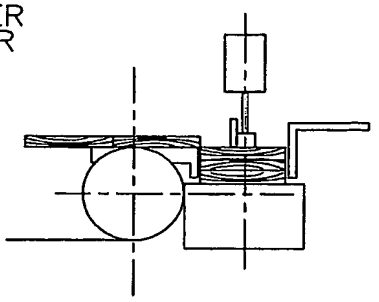


Fig 15b

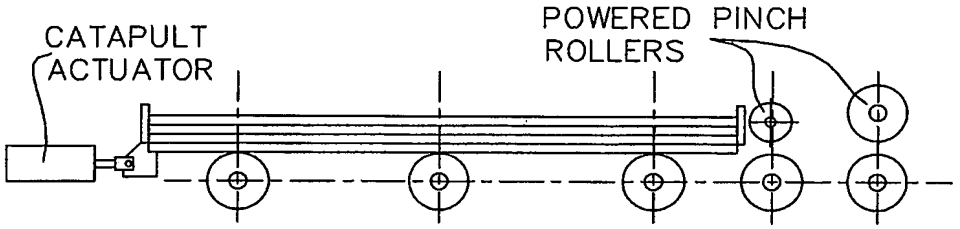


Fig 15c

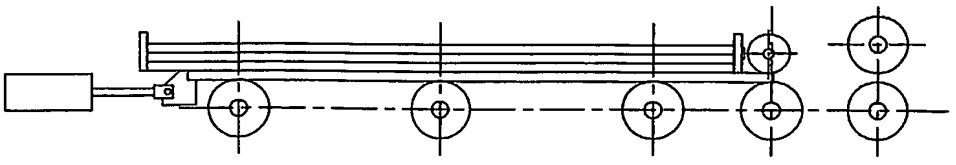


Fig 15d

SHEET FED HOPPER FEEDER DEVICE

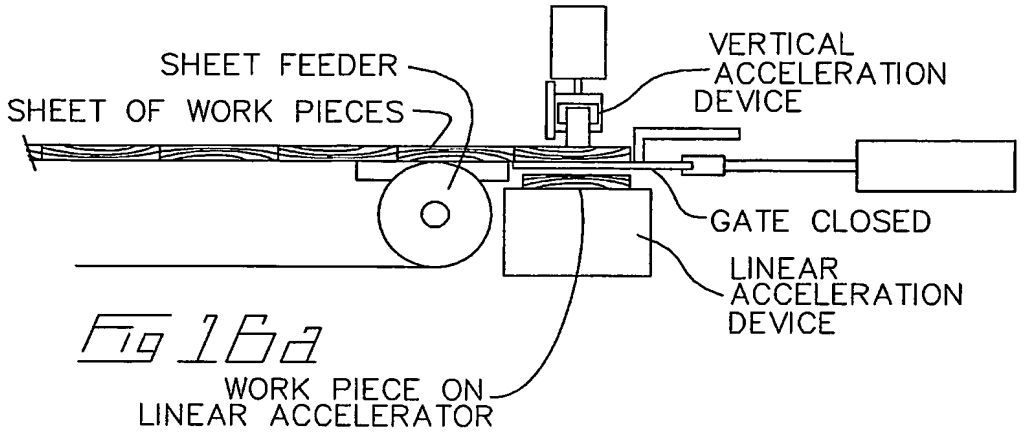


Fig 16a

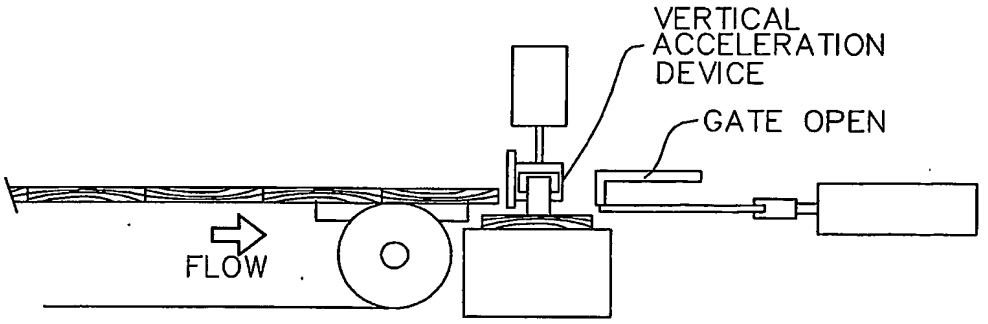


Fig 16b

SHEET FED VERTICAL ACCELERATION DEVICE

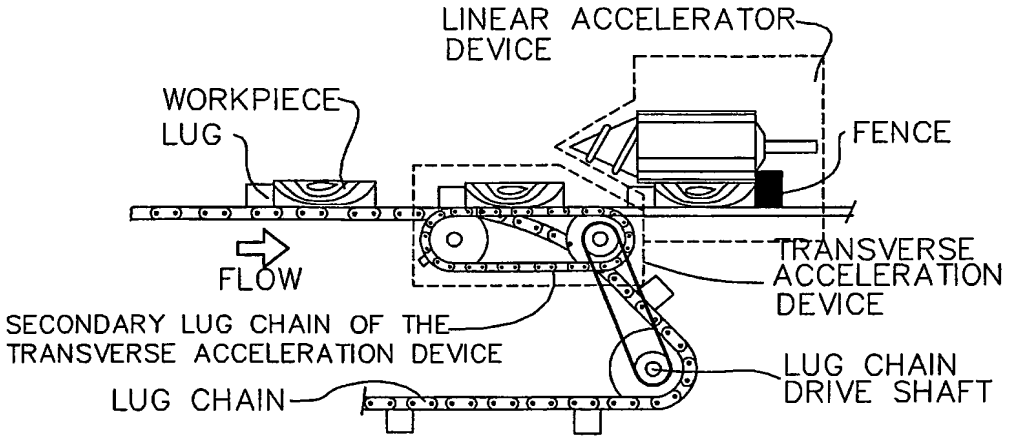


Fig 17

TRANSVERSE ACCELERATION DEVICE FEEDING LINEAR ACCELERATION DEVICE

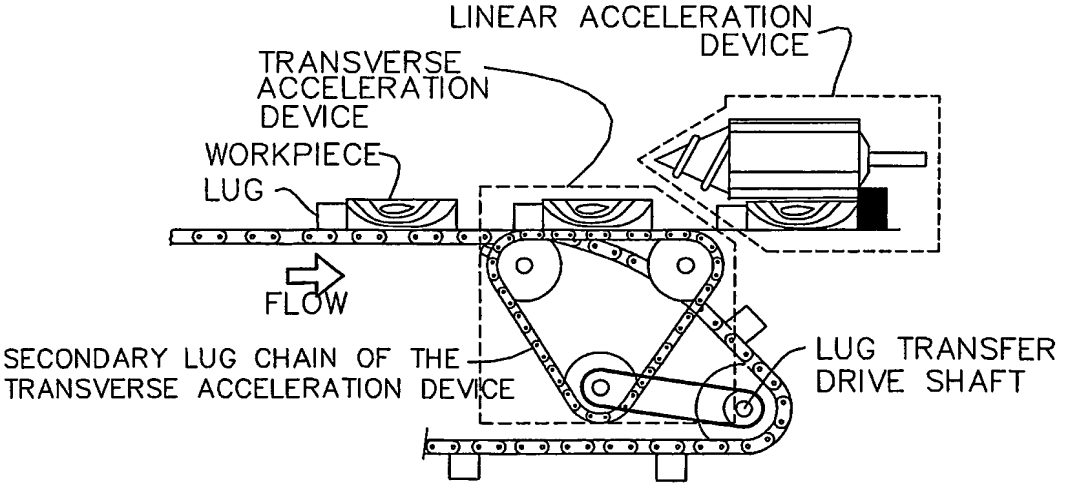


Fig 18

TRANSVERSE ACCELERATION DEVICE FEEDING LINEAR ACCELERATION DEVICE

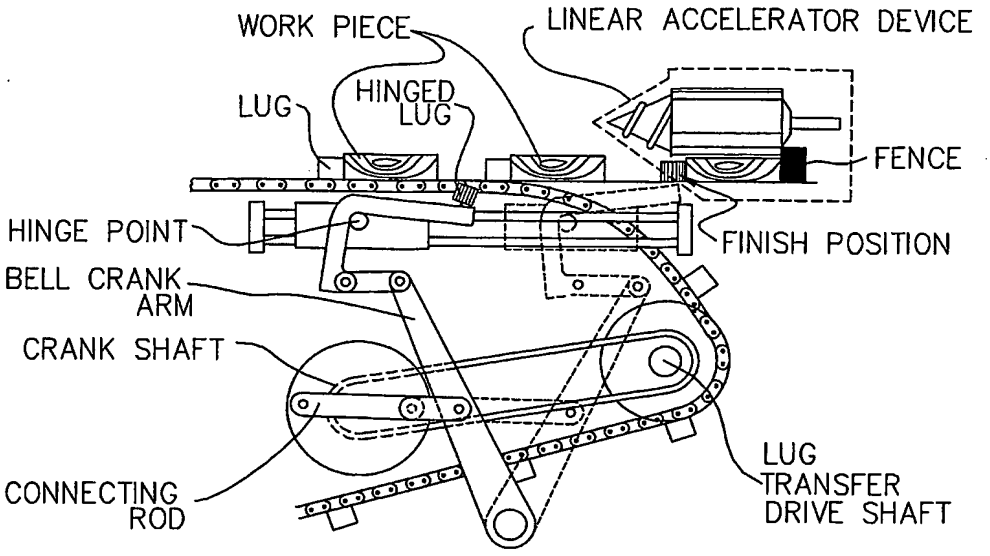


Fig 19

TRANSVERSE ACCELERATION DEVICE
SLIDER CRANK TYPE

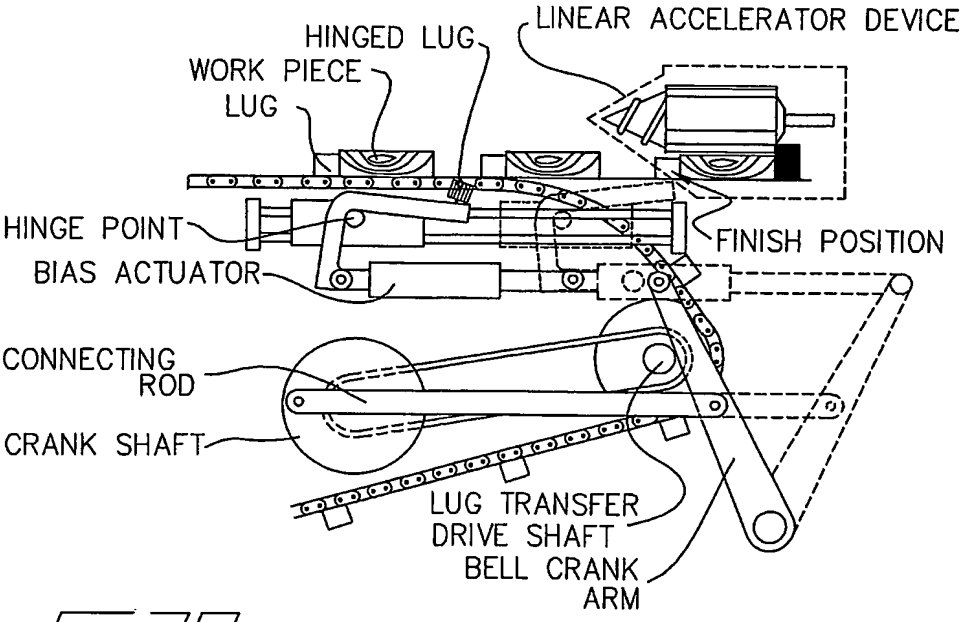


Fig 20

TRANSVERSE ACCELERATION DEVICE

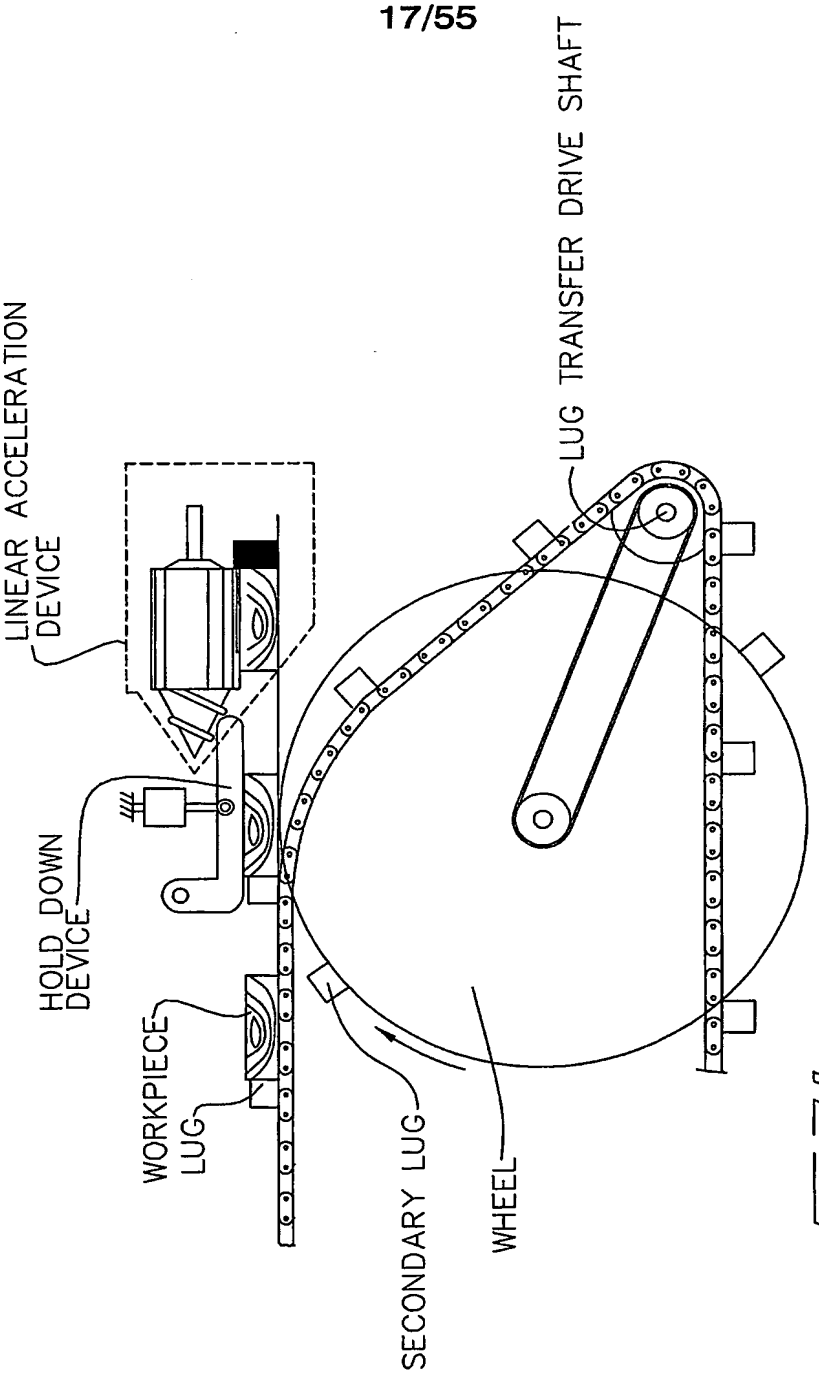

LINEAR ACCELERATION DEVICE
HOLD DOWN DEVICE
WORKPIECE LUG
SECONDARY LUG
WHEEL
LUG TRANSFER DRIVE SHAFT
TRANSVERSE ACCELERATION DEVICE

Fig 21

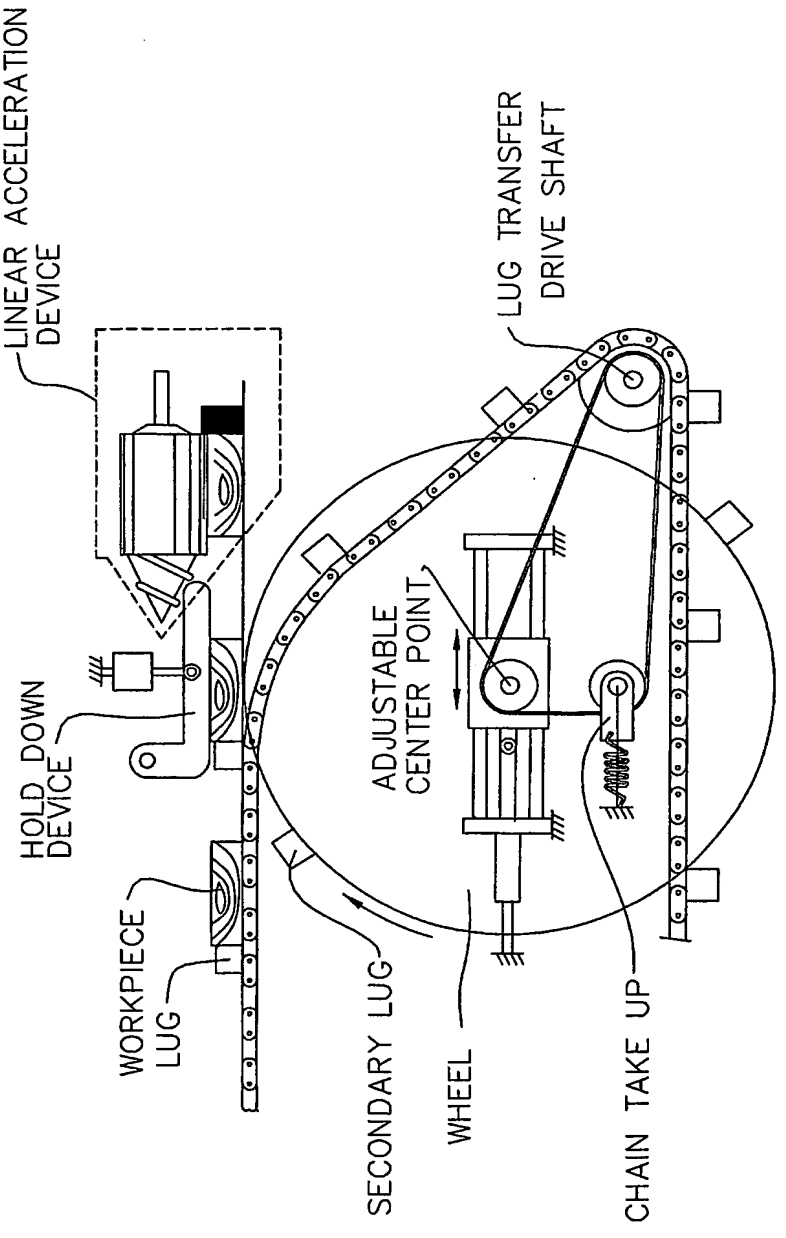


Fig 22

TRANSVERSE ACCELERATION DEVICE

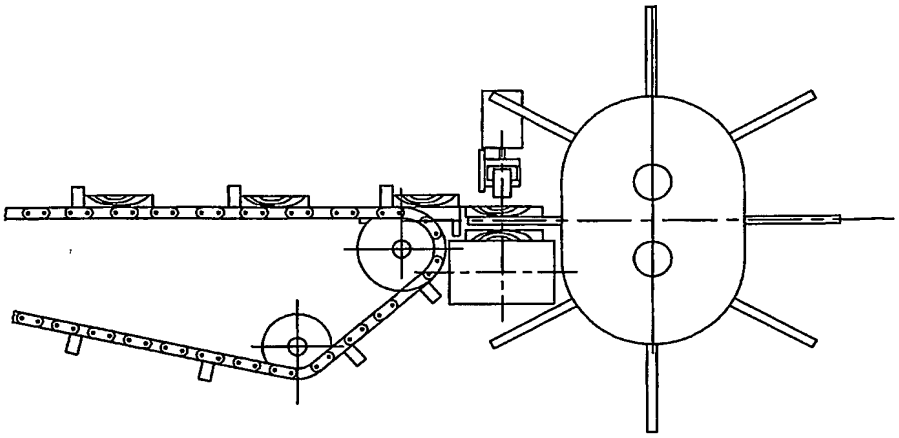


Fig 23a

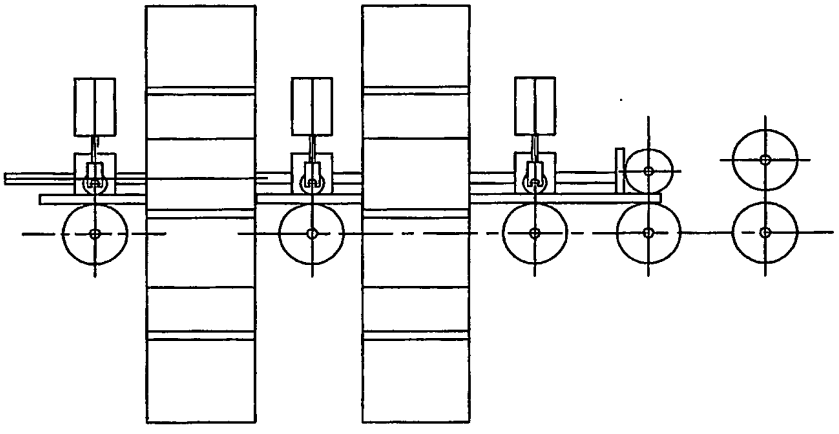


Fig 23b

CONTINUOUS INDEXIBLE SUPPORT ARM
VERTICAL ACCELERATION DEVICE

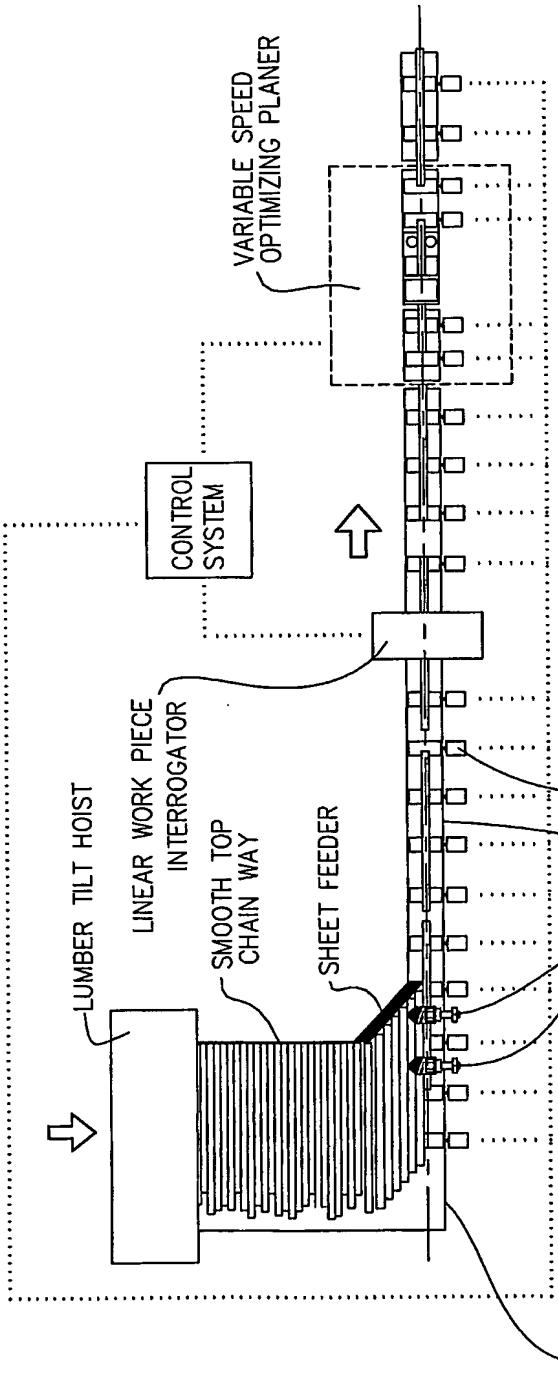


Fig 24

VARIABLE SPEED INFEED TRANSPORT DEVICE WITH A SHEET FED LINEAR ACCELERATOR DEVICE AND A LINEAR WORK PIECE INTERROGATOR

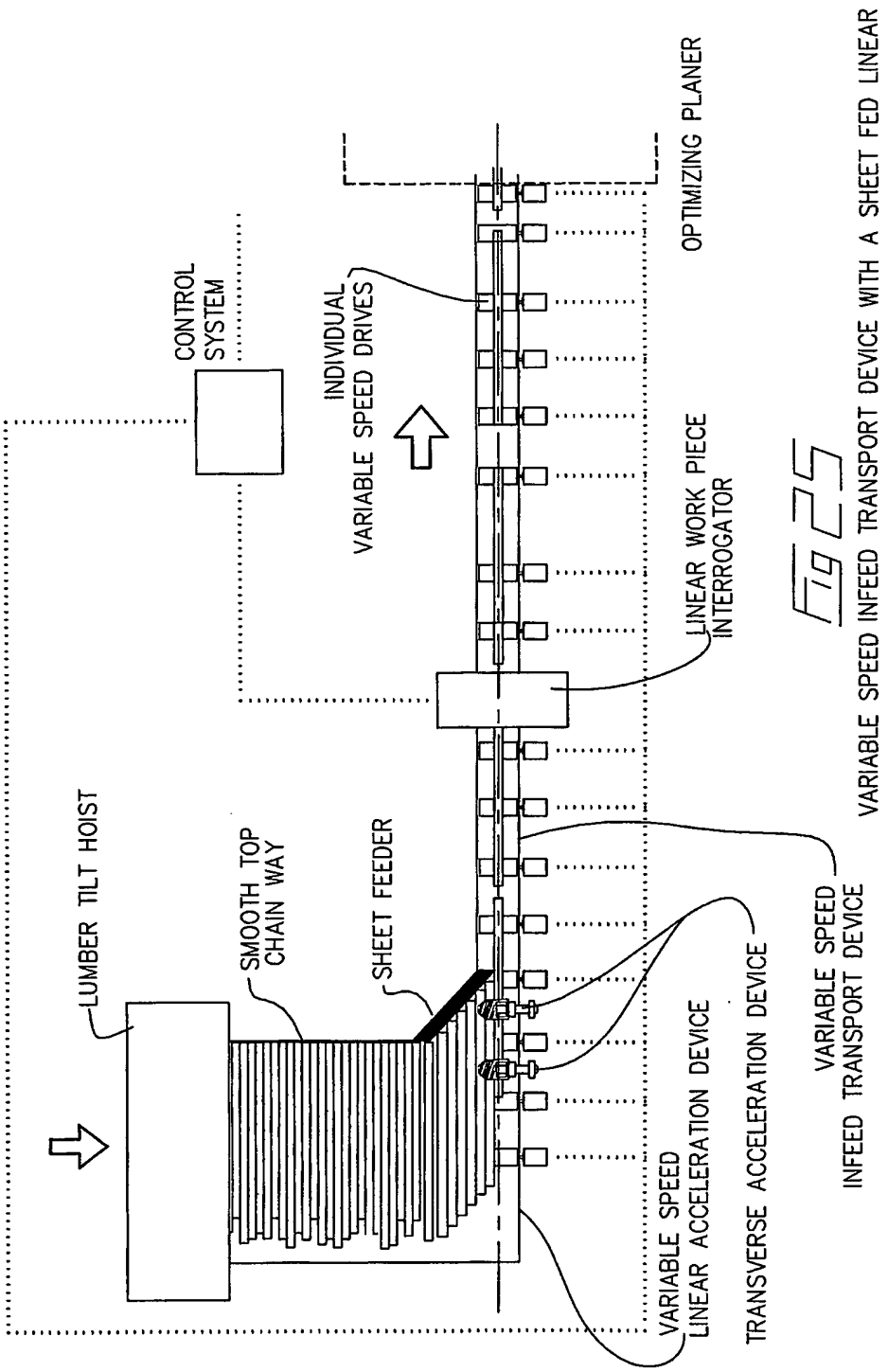


Fig 25

VARIABLE SPEED INFEED TRANSPORT DEVICE WITH A SHEET FED LINEAR ACCELERATION DEVICE AND A LINEAR WORK PIECE INTERROGATOR (WITH A CLOSED LOOP NON OPTIMIZING CONTROL)

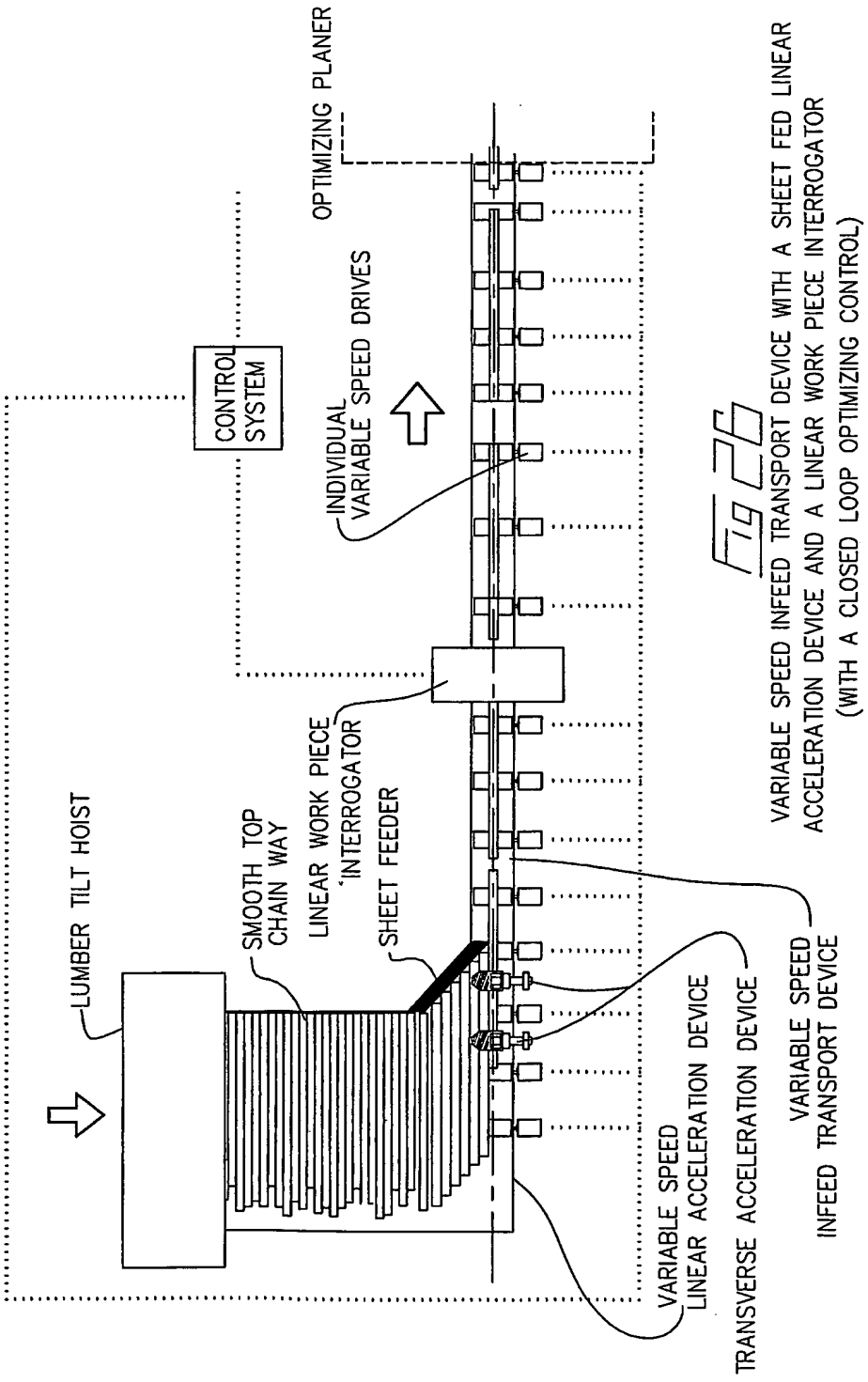


Fig 26

VARIABLE SPEED INFEED TRANSPORT DEVICE WITH A SHEET FED LINEAR ACCELERATION DEVICE AND A LINEAR WORK PIECE INTERROGATOR (WITH A CLOSED LOOP OPTIMIZING CONTROL)

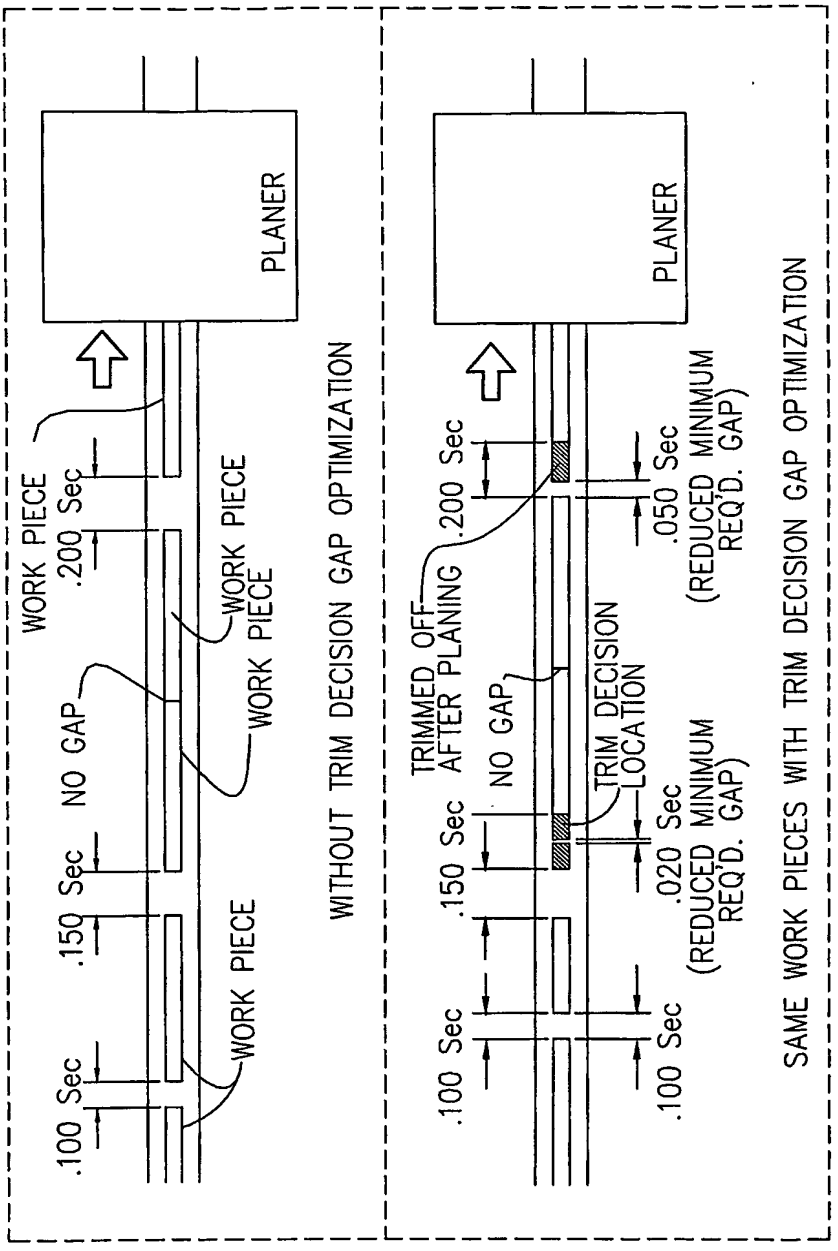


Fig 27

EXAMPLE OF FULLY OPTIMIZED GAP CONTROL
(WITH AND WITHOUT THE ADDITION OF TRIM DECISION GAP OPTIMIZATION)

	SHEET FEEDER	FIXED SPEED LUG TRANSFER	VARIABLE SPEED LUG TRANSFER	FIXED SPEED TAD	VARIABLE SPEED TAD	VERTICAL AD	FIXED SPEED LAD	VARIABLE SPEED LAD	FIXED SPEED ITD	VARIABLE SPEED ITD	FIXED SPEED PLANER	VARIABLE SPEED PLANER	LINEAR WPI	TRANSVERSE WPI	WPS	OLNO	CLNO	CLO
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	X						X		X		X		X			X		
2	X						X			X	X		X		X		X	
3	X						X			X	X		X		X			X
4	X						X			X		X	X		X		X	
5	X						X			X		X	X		X			X
6	X							X	X		X		X		X		X	
7	X							X	X		X		X		X			X
8	X							X	X			X	X		X		X	
9	X							X	X			X	X		X			X
10	X							X		X	X		X		X		X	
11	X							X		X	X		X		X			X
12	X							X		X		X	X		X		X	
13	X							X		X		X	X		X			X
14	X					X	X		X		X		X			X		
15	X					X	X			X	X		X		X		X	
16	X					X	X			X	X		X		X			X
17	X					X	X			X		X	X		X		X	
18	X					X	X			X		X	X		X			X
19	X					X		X	X		X		X		X		X	
20	X					X		X	X		X		X		X			X
21	X					X		X		X	X		X		X		X	
22	X					X		X		X	X		X		X			X
23	X	X					X		X		X			X		X		
24	X	X					X			X	X			X	X		X	
25	X	X					X			X	X		X	X	X		X	
26	X	X					X			X		X		X	X		X	
27	X	X					X			X		X	X	X	X		X	
28		X					X				X			X		X		
29		X					X		X		X			X		X		
30		X		X			X		X		X			X		X		
31		X		X			X				X			X		X		
32		X					X			X	X			X	X		X	
33		X		X			X			X	X			X	X		X	
34			X				X				X			X	X		X	
35			X				X				X			X	X			X
36			X	X			X				X			X	X		X	
37			X	X			X				X			X	X			X
38			X		X		X				X			X	X		X	
39			X		X		X				X			X	X			X
40			X					X			X			X	X		X	
41			X					X			X			X	X			X
42			X				X			X	X			X	X		X	
43			X				X			X	X			X	X			X
44			X				X			X		X		X	X		X	

Fig 28

CONTINUATION OF

Fig 2B

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
	SHEET FEEDER	FIXED SPEED LUG TRANSFER	VARIABLE SPEED LUG TRANSFER	FIXED SPEED TAD	VARIABLE SPEED TAD	VERTICAL AD	FIXED SPEED LAD	VARIABLE SPEED LAD	FIXED SPEED ITD	VARIABLE SPEED ITD	FIXED SPEED PLANER	VARIABLE SPEED PLANER	LINEAR WPI	TRANSVERSE WPI	WPS	OLNO	CLNO	CLO
45			X				X			X		X		X	X			X
46			X	X				X	X		X			X	X		X	
47			X	X				X	X		X			X	X			X
48			X	X				X		X	X			X	X		X	
49			X	X				X		X	X			X	X			X
50			X	X				X		X		X		X	X		X	
51			X	X				X		X		X		X	X			X
52			X		X		X		X		X			X	X		X	
53			X		X		X		X		X			X	X			X
54			X		X			X	X		X			X	X		X	
55			X		X			X	X		X			X	X			X
56			X		X			X		X	X			X	X		X	X
57			X		X			X		X	X			X	X			X
58			X		X			X		X		X		X	X		X	
59			X		X			X		X		X		X	X			X
60		X				X	X				X			X		X		
61		X				X	X		X		X			X		X		
62		X				X	X			X	X			X	X		X	
63		X				X		X		X	X			X	X		X	
64		X				X		X		X	X			X	X			X
65		X				X		X		X		X		X	X		X	
66		X				X		X		X		X		X	X			X
67			X			X	X				X			X	X		X	
68			X			X	X				X			X	X			X
69			X			X	X		X		X			X	X		X	
70			X			X	X		X		X			X	X			X
71			X			X		X	X		X			X	X		X	
72			X			X		X	X		X			X	X			X
73			X			X		X		X	X			X	X		X	
74			X			X		X		X	X			X	X			X
75			X			X		X		X		X		X	X		X	
76			X			X		X		X		X		X	X			X
77			X			X	X			X		X		X	X		X	
78			X			X	X			X		X		X	X			X
79			X			X			X			X		X	X		X	
80			X			X			X			X		X	X			X
81			X			X	X			X	X			X	X		X	
82			X			X	X			X	X			X	X			X
83			X	X			X		X		X		X		X		X	
84			X	X			X			X	X		X		X			X
85			X	X			X			X	X		X		X		X	
86			X		X		X			X	X		X		X		X	
87			X		X		X			X	X		X		X			X
88			X		X			X			X		X		X			X

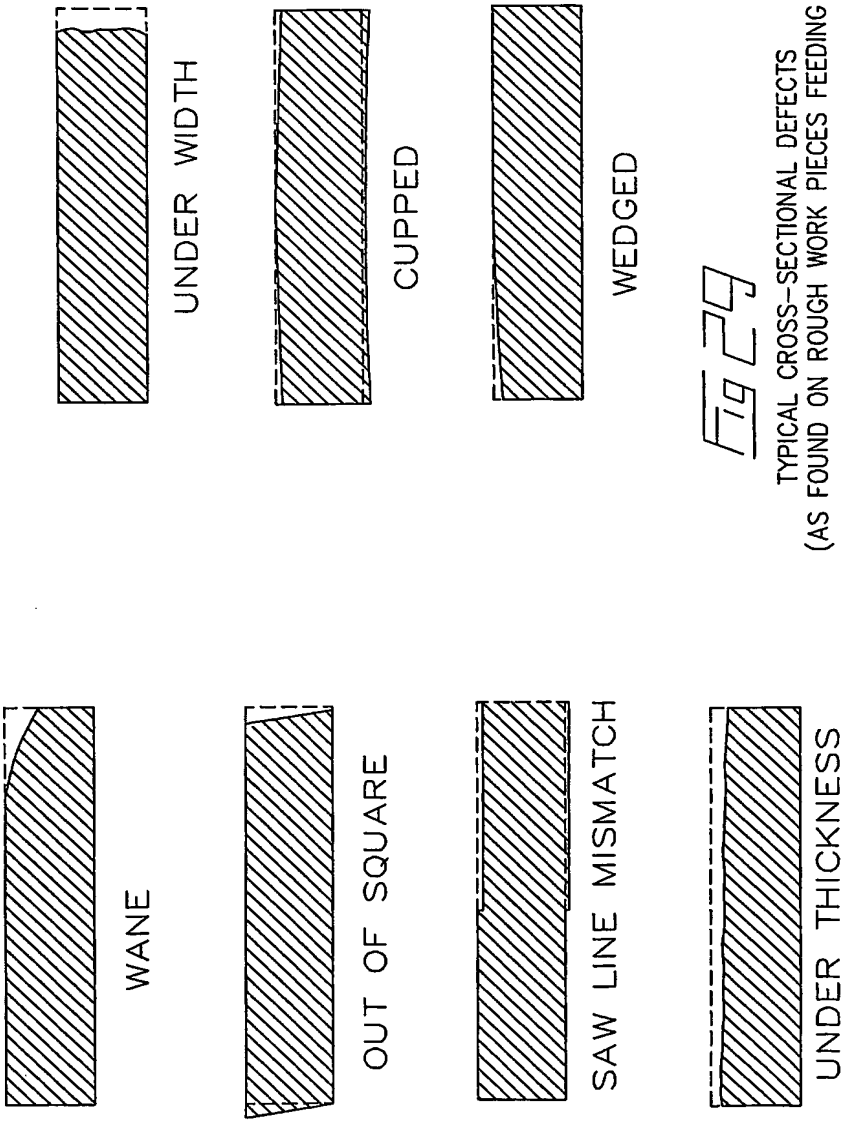
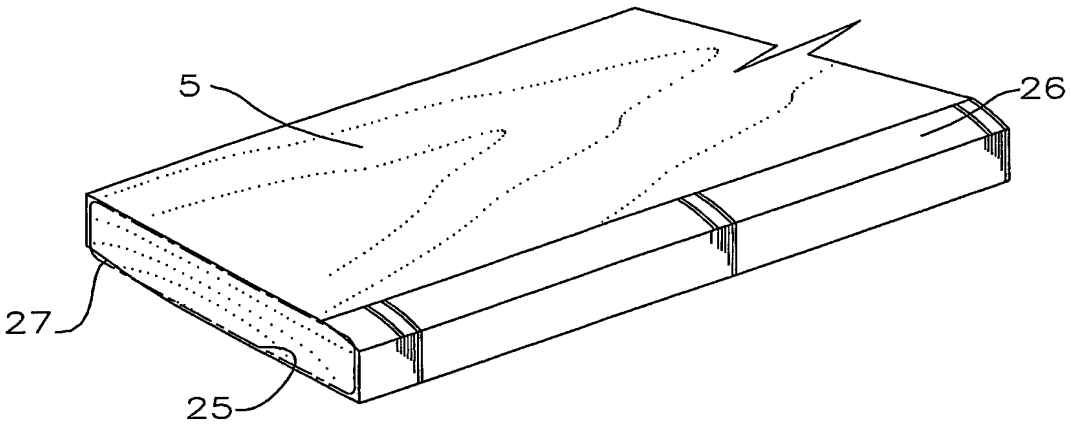


Fig 29

TYPICAL CROSS-SECTIONAL DEFECTS
(AS FOUND ON ROUGH WORK PIECES FEEDING A PLANER)



NON-OPTIMIZED PLANING OF A WORK PIECE

Fig 30

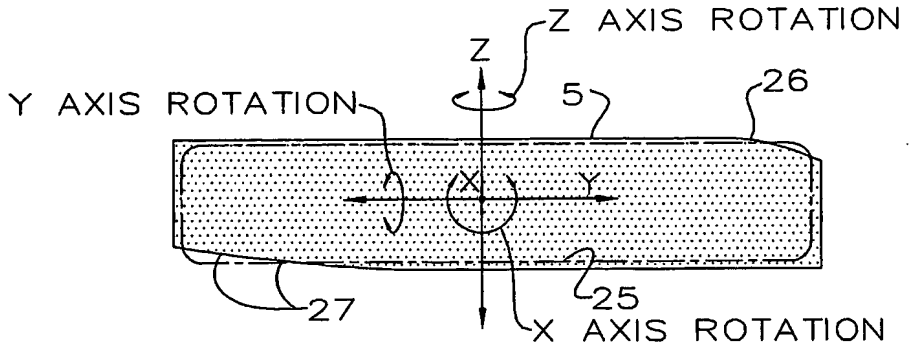
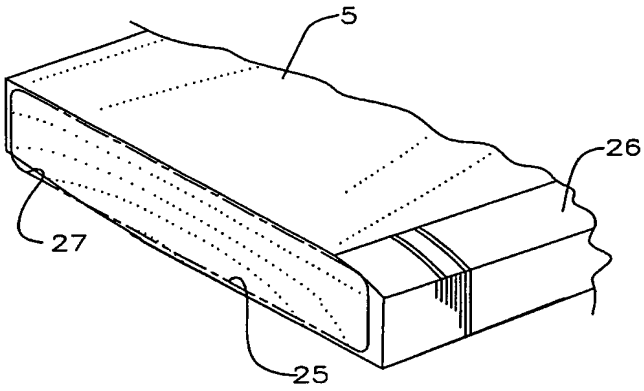


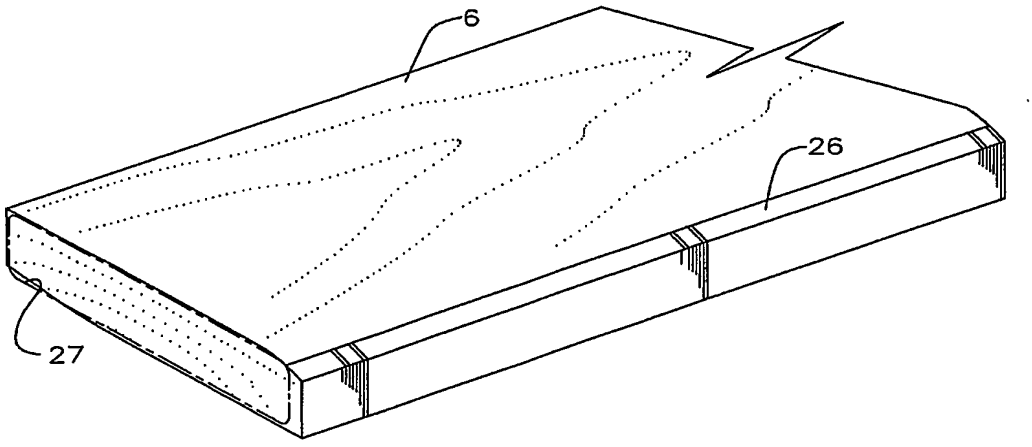
Fig 31

NON-OPTIMIZED PLANING OF A WORK PIECE



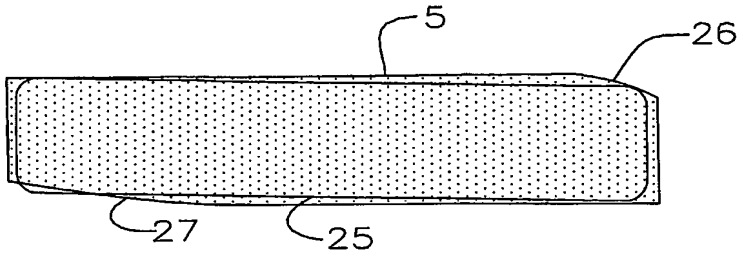
NON-OPTIMIZED PLANING OF A WORK PIECE

Fig 32



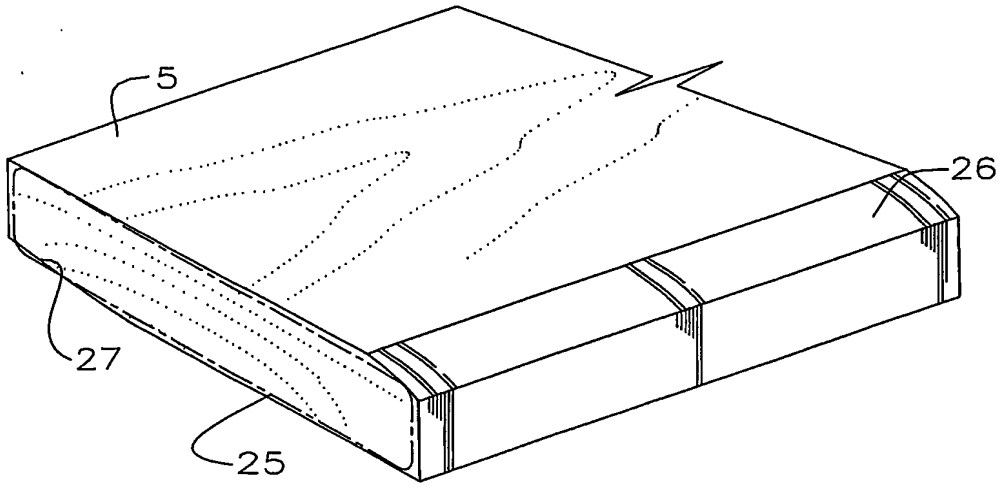
NON-OPTIMIZED PLANING OF A WORK PIECE

Fig 33



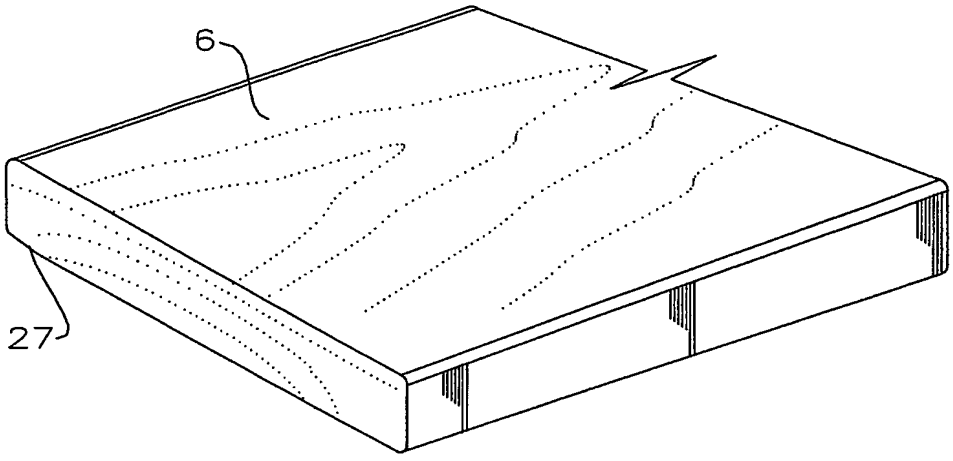
OPTIMIZED PLANING OF A WORK PIECE

Fig 34



OPTIMIZED PLANING OF A WORK PIECE

Fig 35



OPTIMIZED PLANING OF A WORK PIECE

Fig 36

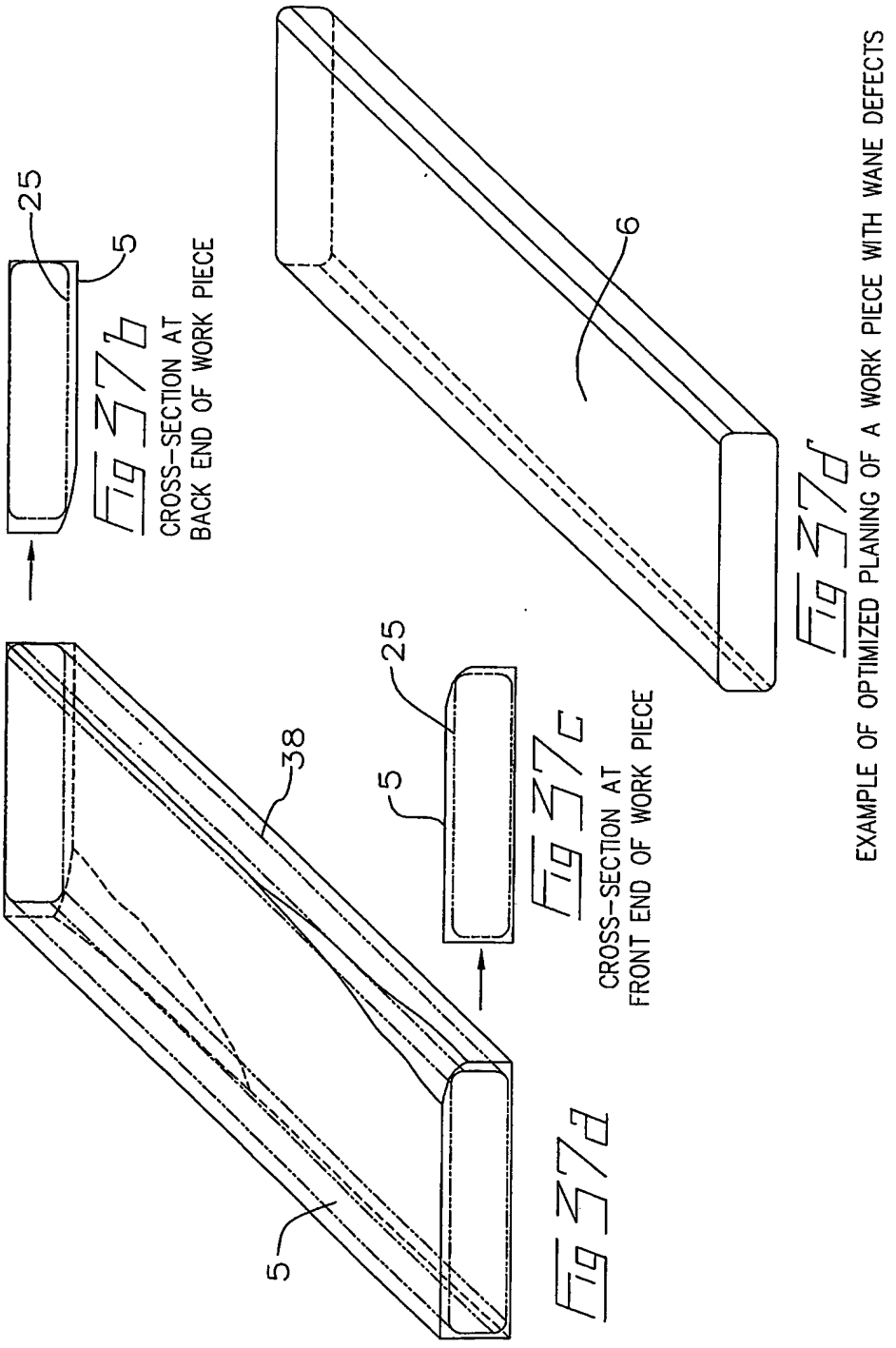


Fig 37b CROSS-SECTION AT BACK END OF WORK PIECE

Fig 37d EXAMPLE OF OPTIMIZED PLANING OF A WORK PIECE WITH WANE DEFECTS

Fig 37c CROSS-SECTION AT FRONT END OF WORK PIECE

Fig 37a

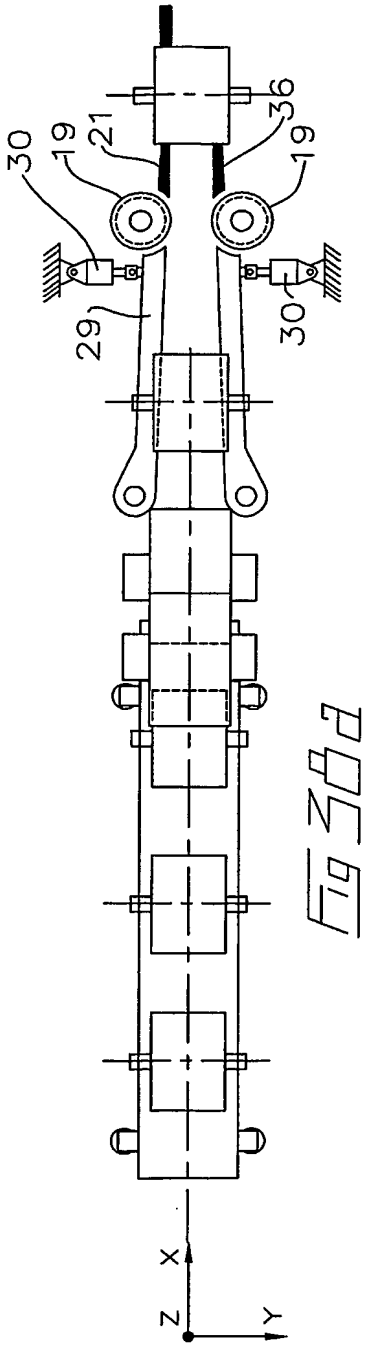


Fig 30a

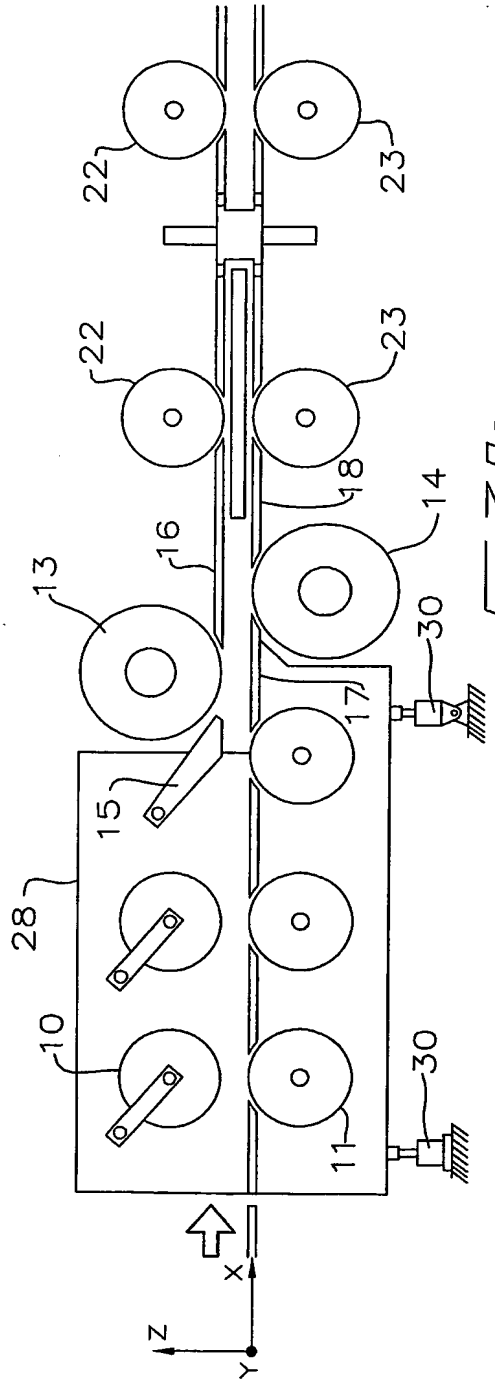


Fig 30b

OPTIMIZING PLANER–THREE AXIS INFEED POSITIONING MODULE WITH INTERMEDIATE SIDE HEAD STEERING

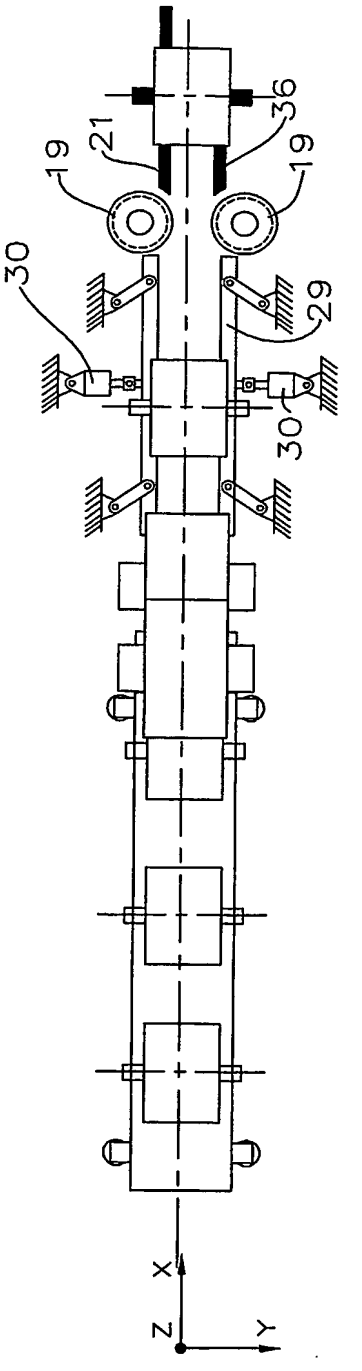


Fig 39a

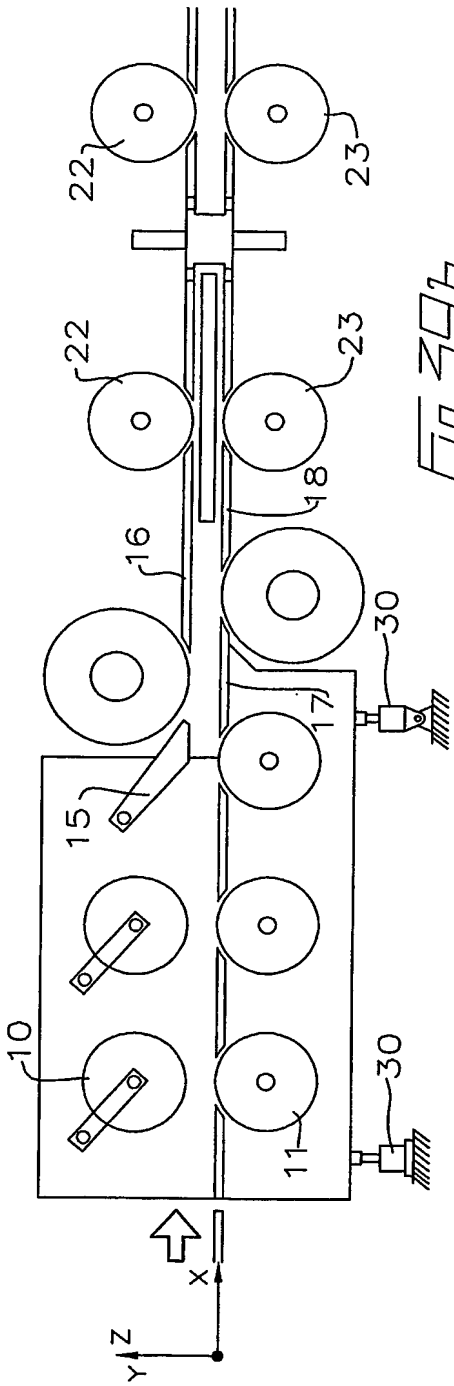


Fig 39b

OPTIMIZING PLANER-THREE AXIS INFEED POSITIONING MODULE WITH PARALLEL INTERMEDIATE SIDE HEAD STEERING

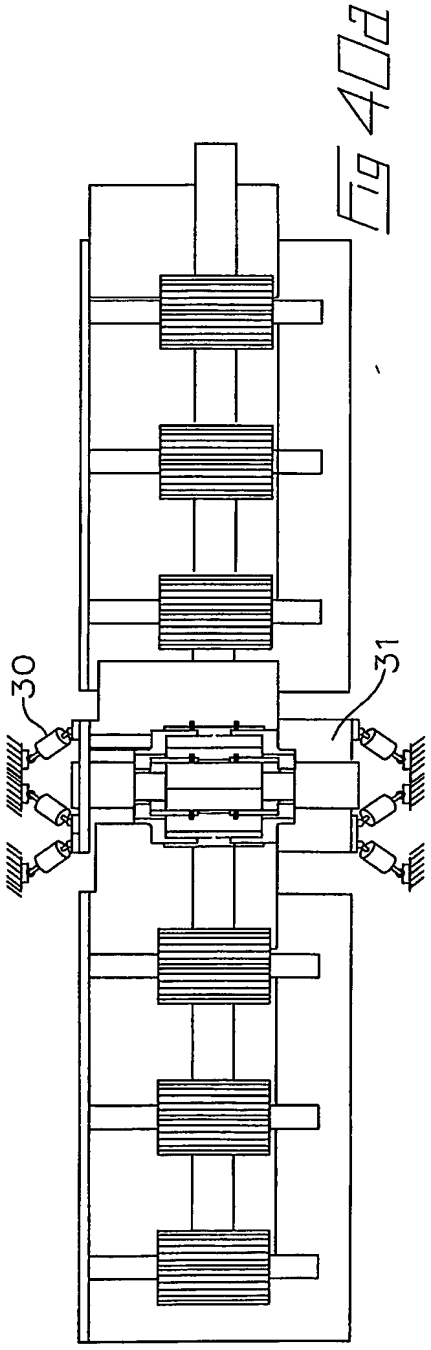


Fig 40a

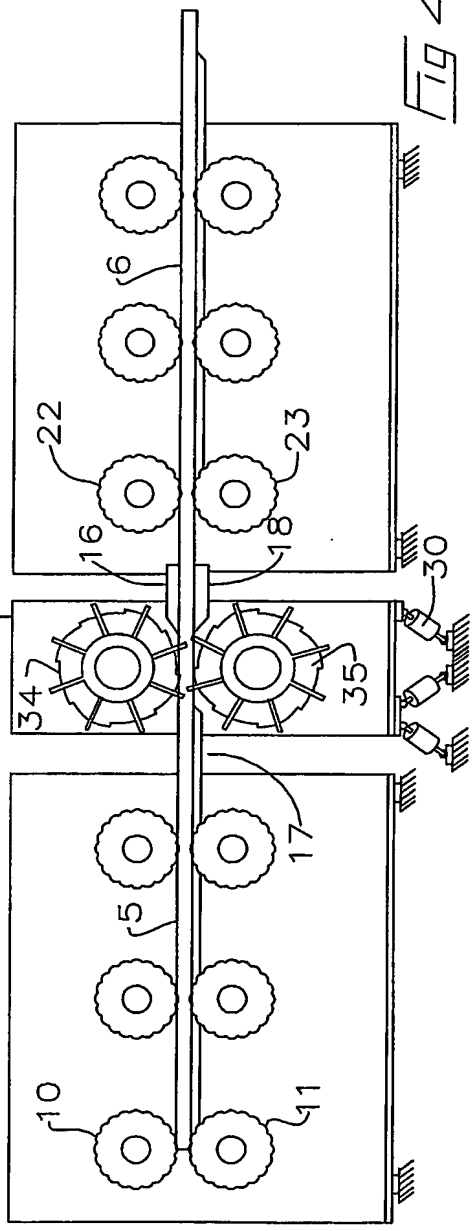


Fig 40b

OPTIMIZING PLANER–WITH SINGLE PLANE SIX AXIS SHAPING MODULE

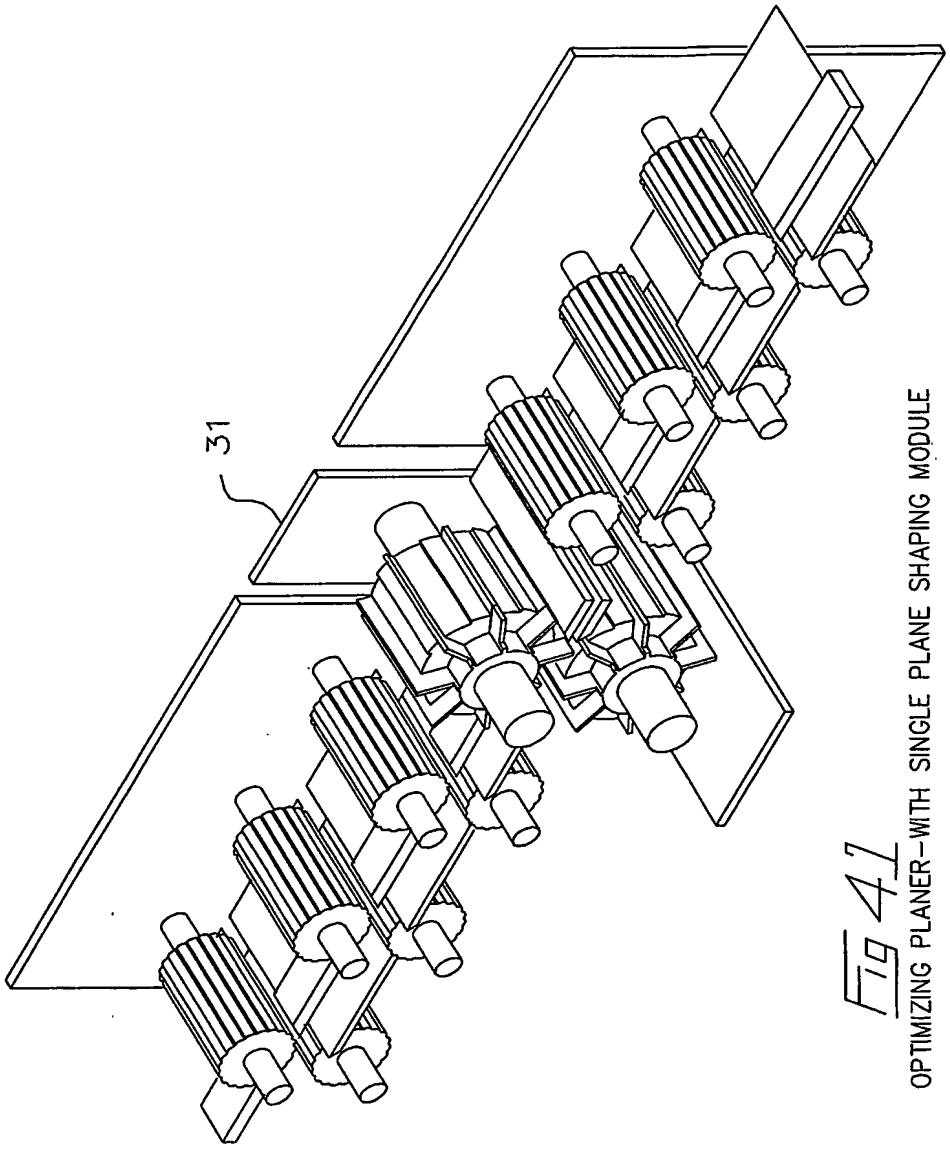


Fig 41
OPTIMIZING PLANER–WITH SINGLE PLANE SHAPING MODULE

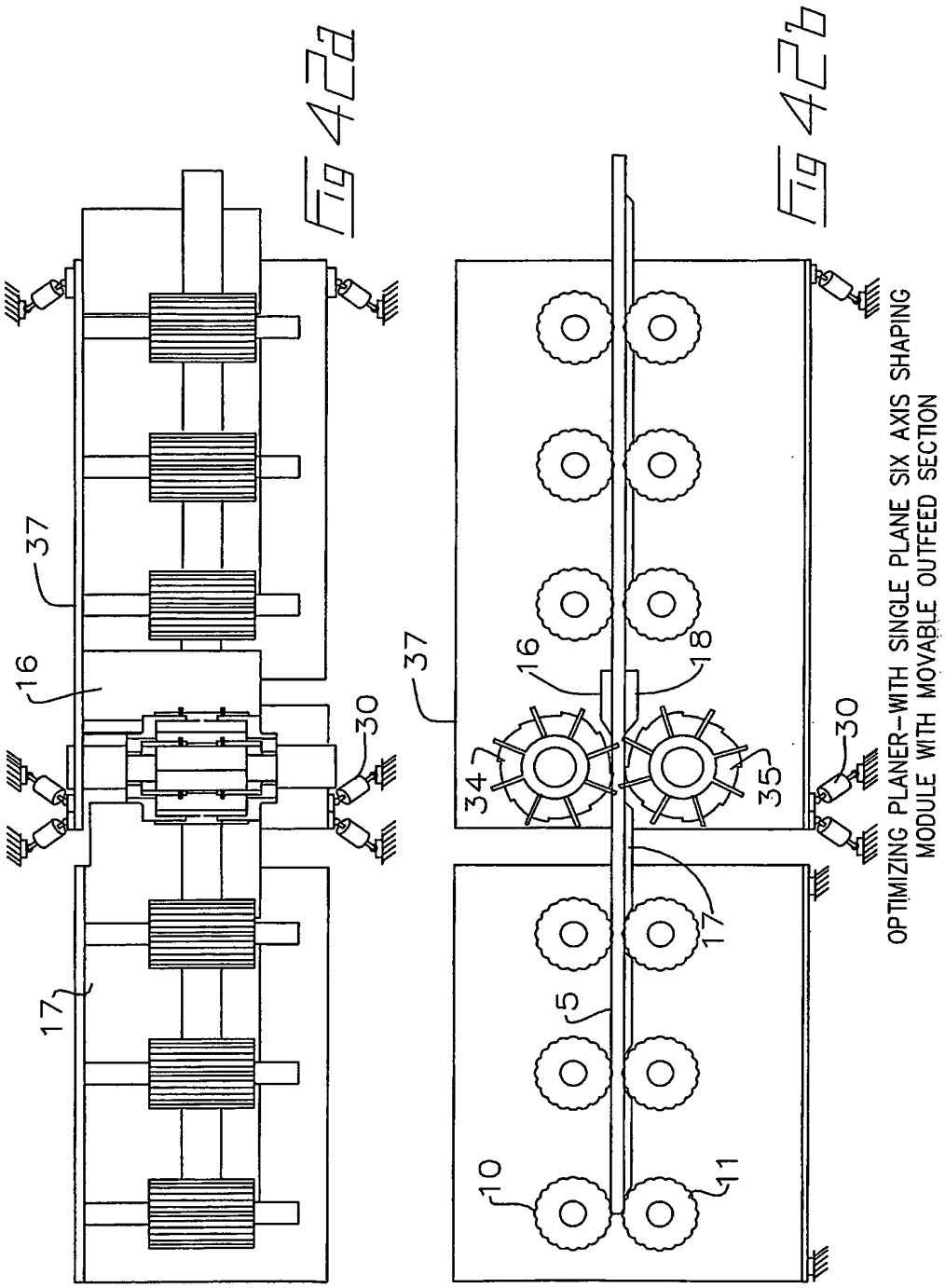


Fig 4Ca
Fig 4Cb
OPTIMIZING PLANER–WITH SINGLE PLANE SIX AXIS SHAPING MODULE WITH MOVABLE OUTFEED SECTION
37
16
30
17
5
10
11
18
34
35

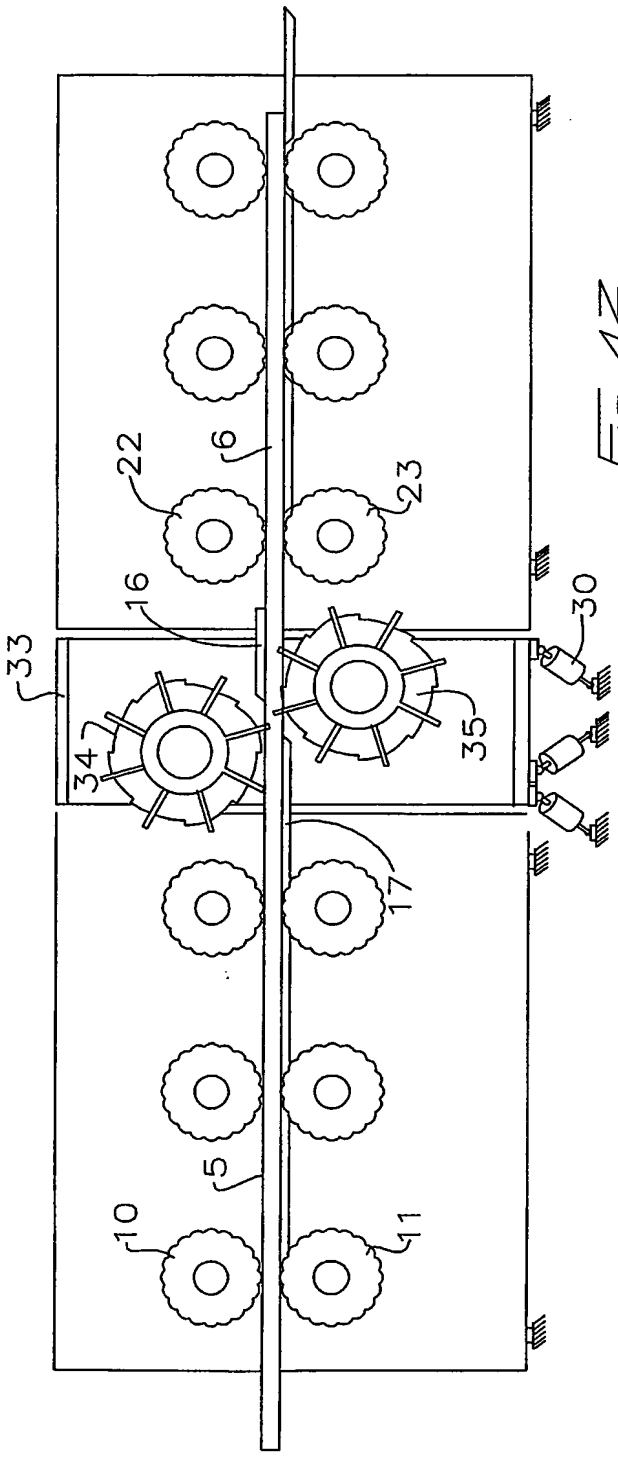


Fig 43

OPTIMIZING PLANER--WITH OFFSET PLANER HEAD SIX AXIS SHAPING MODULE

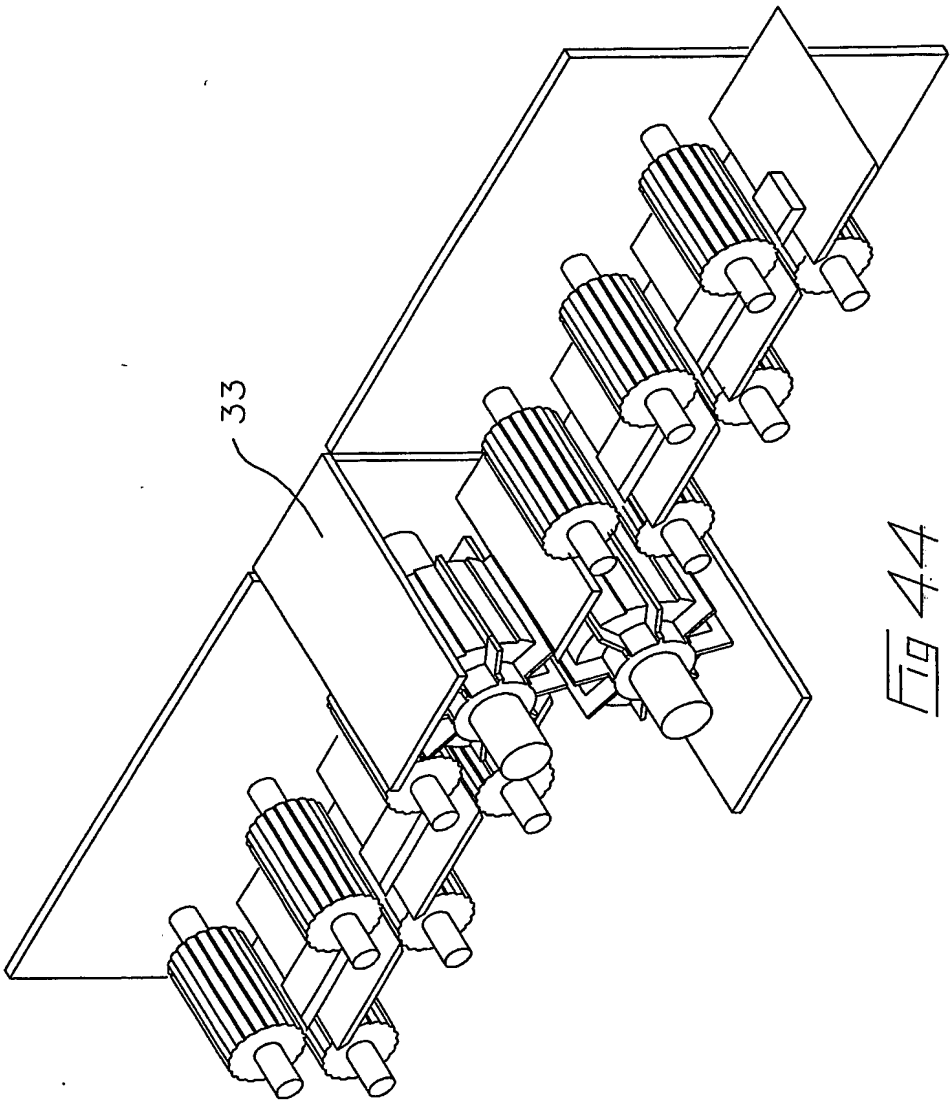


Fig 44

OPTIMIZING PLANER–WITH OFFSET PLANER HEAD SIX AXIS SHAPING MODULE

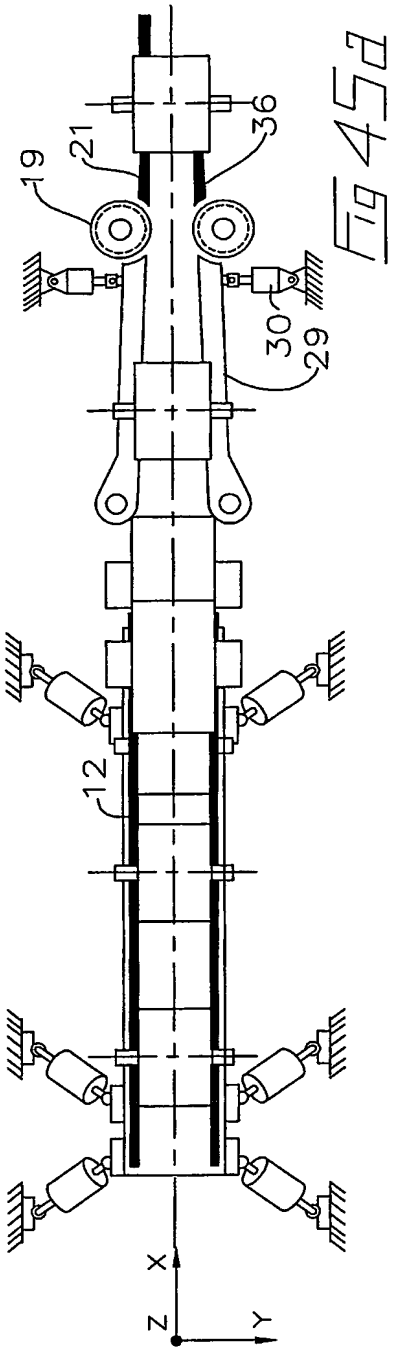


Fig 45a

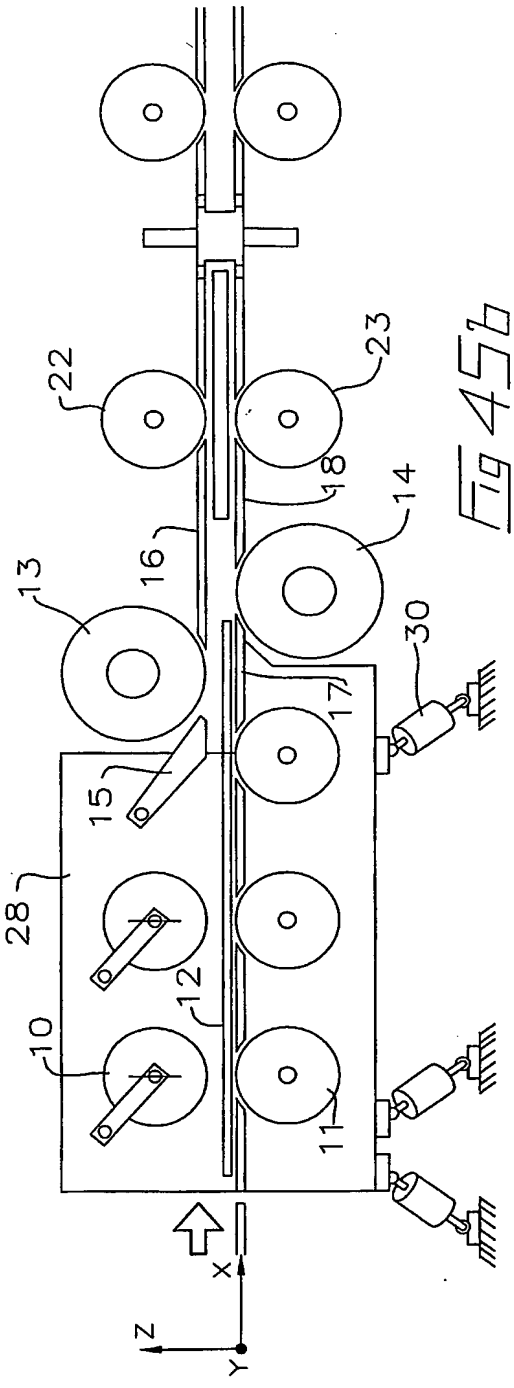


Fig 45b

OPTIMIZING PLANER WITH SIX AXIS INFEED POSITIONING MODULE AND INTERMEDIATE SIDE STEERING MODULE

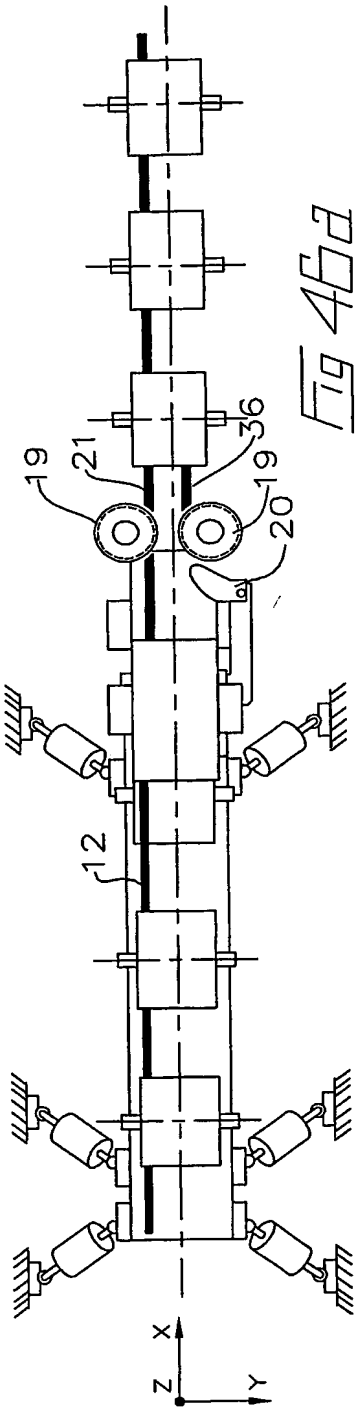


Fig 46a

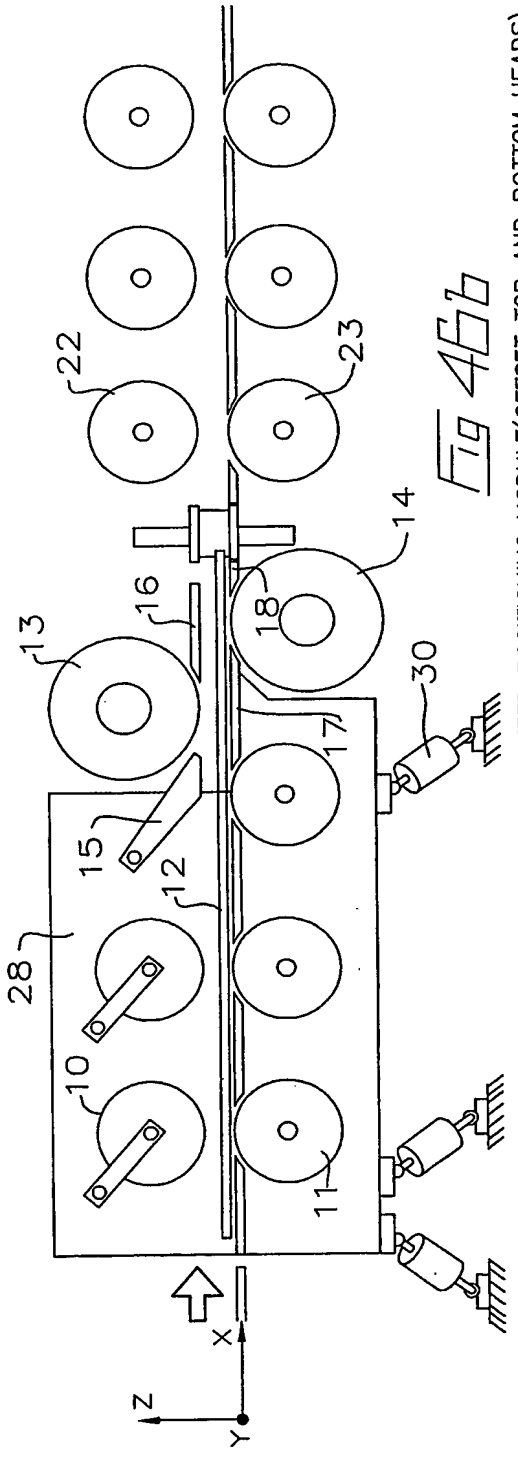


Fig 46b

OPTIMIZING PLANER WITH SIX AXIS INFEED POSITIONING MODULE(OFFSET TOP AND BOTTOM HEADS)

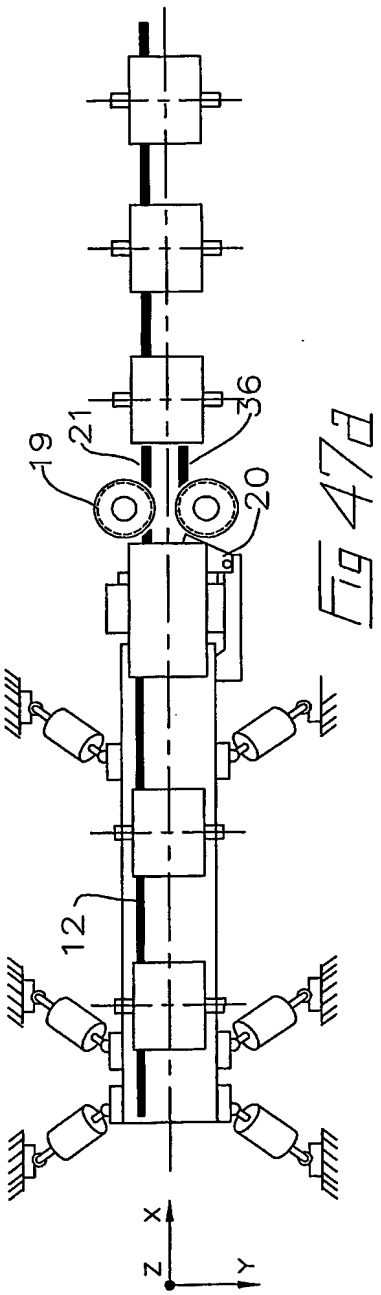


Fig 47a

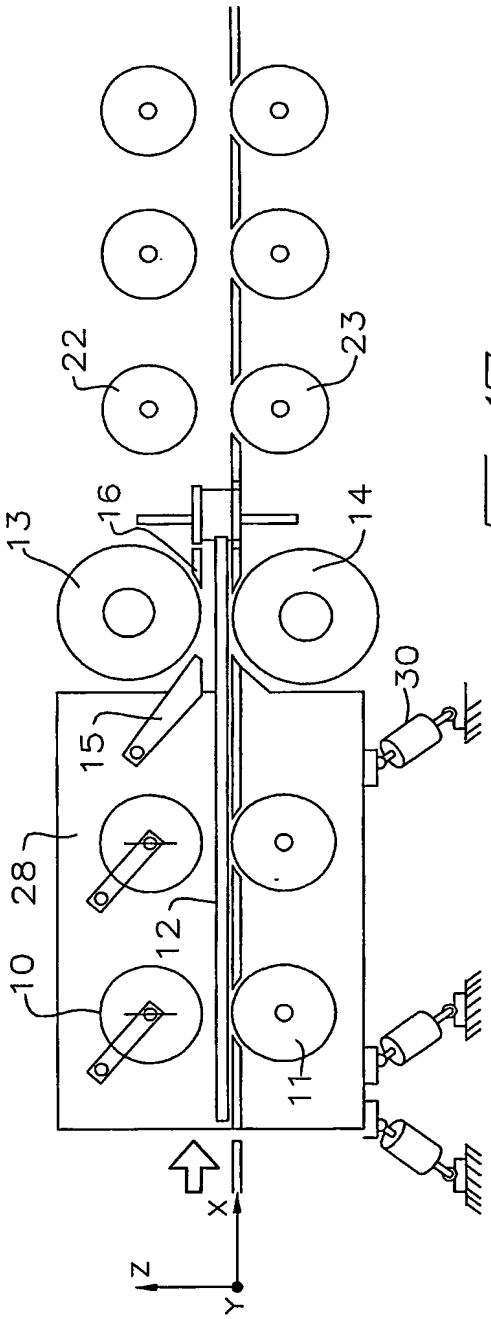


Fig 47b

OPTIMIZING PLANER WITH SIX AXIS INFEED POSITIONING MODULE (INLINE TOP AND BOTTOM HEADS)

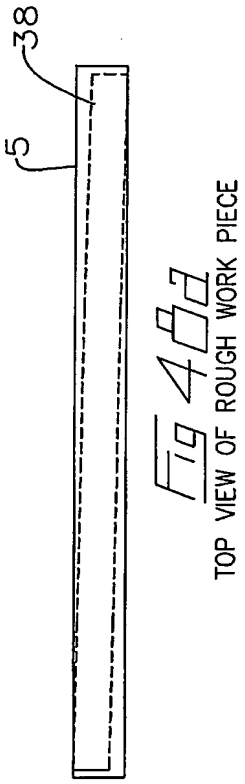


Fig 40a
TOP VIEW OF ROUGH WORK PIECE

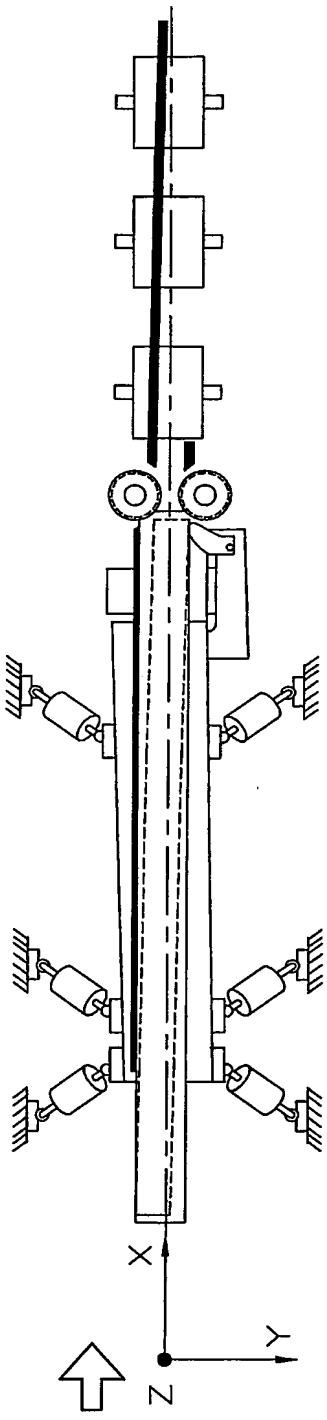


Fig 40
OPTIMIZED PLANER-FEEDING EXAMPLE(TOP VIEW)

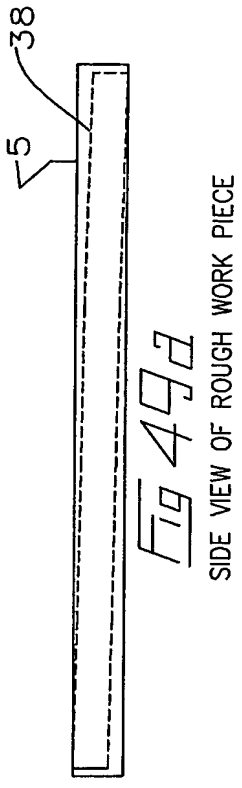


Fig 49a
SIDE VIEW OF ROUGH WORK PIECE

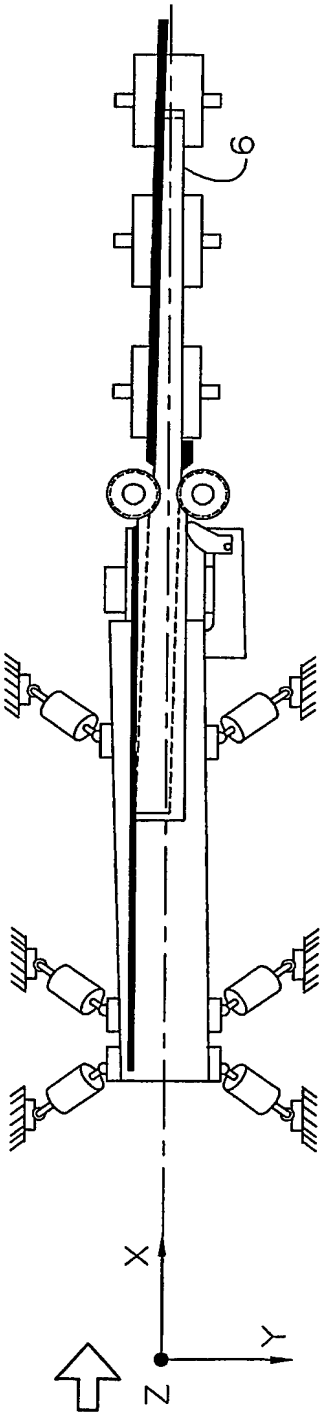
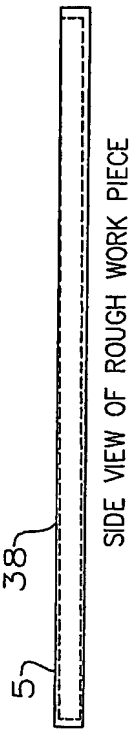


Fig 49
OPTIMIZED PLANER-FEEDING EXAMPLE(TOP VIEW)



SIDE VIEW OF ROUGH WORK PIECE

Fig 50a

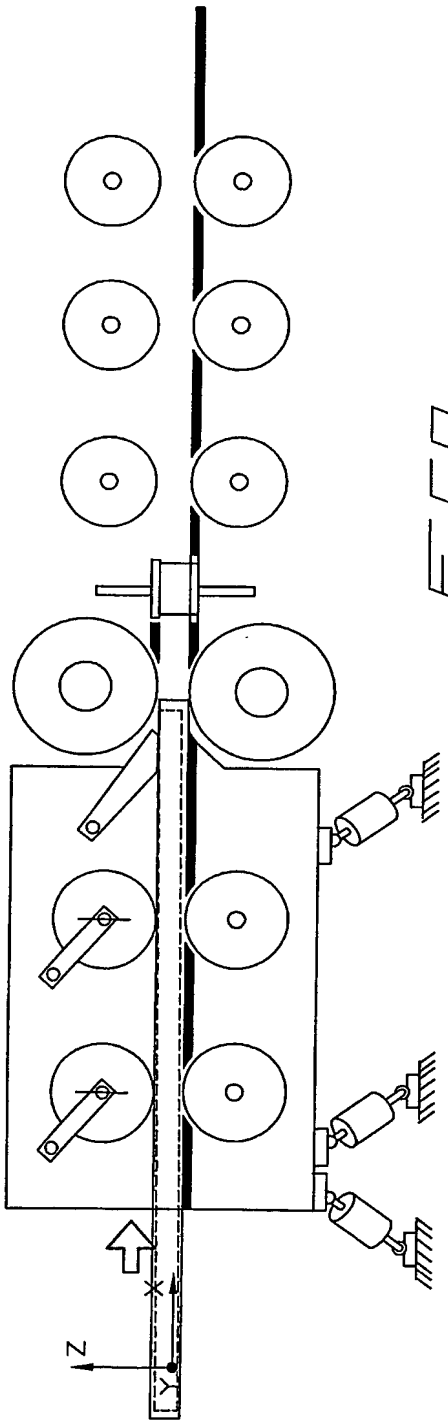


Fig 50

OPTIMIZED PLANER-FEEDING EXAMPLE(SIDE VIEW)

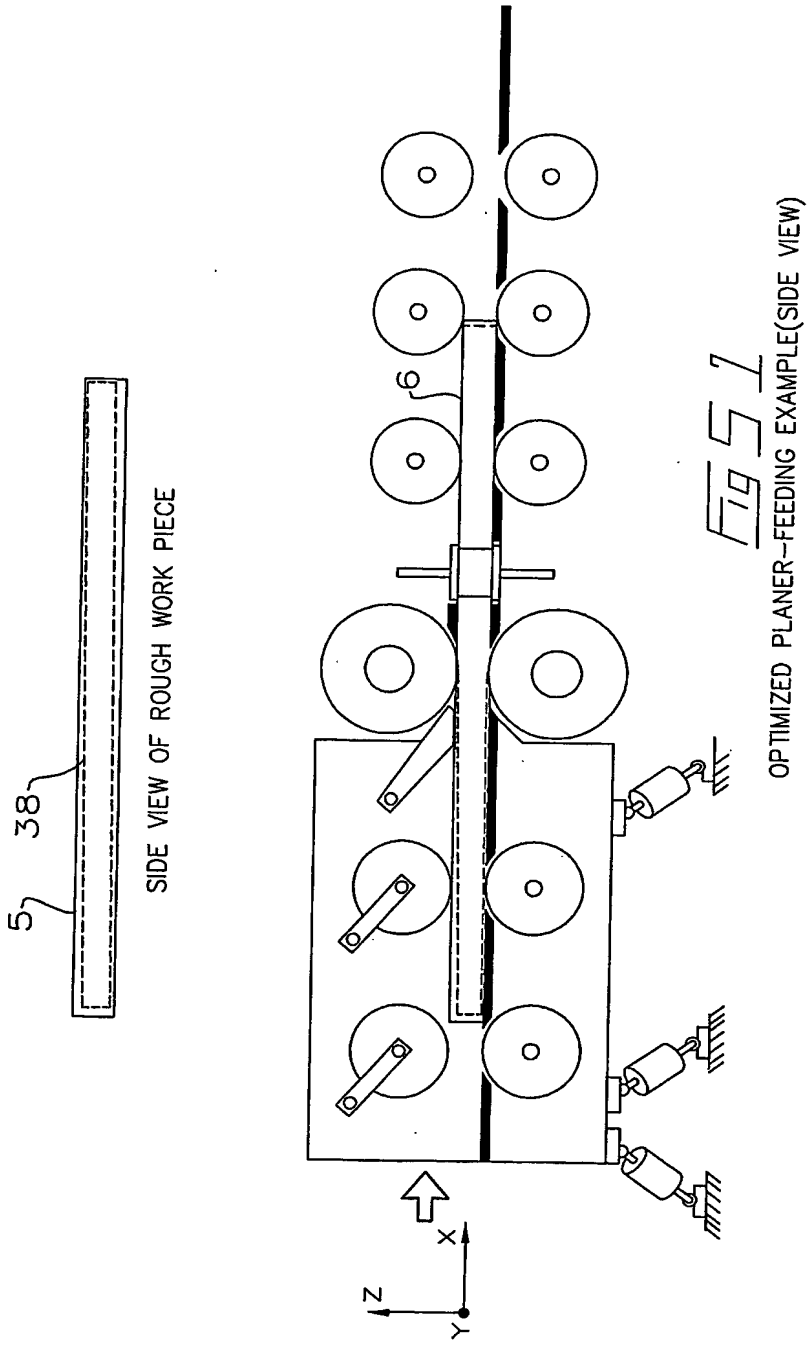


Fig 51

OPTIMIZED PLANER-FEEDING EXAMPLE(SIDE VIEW)

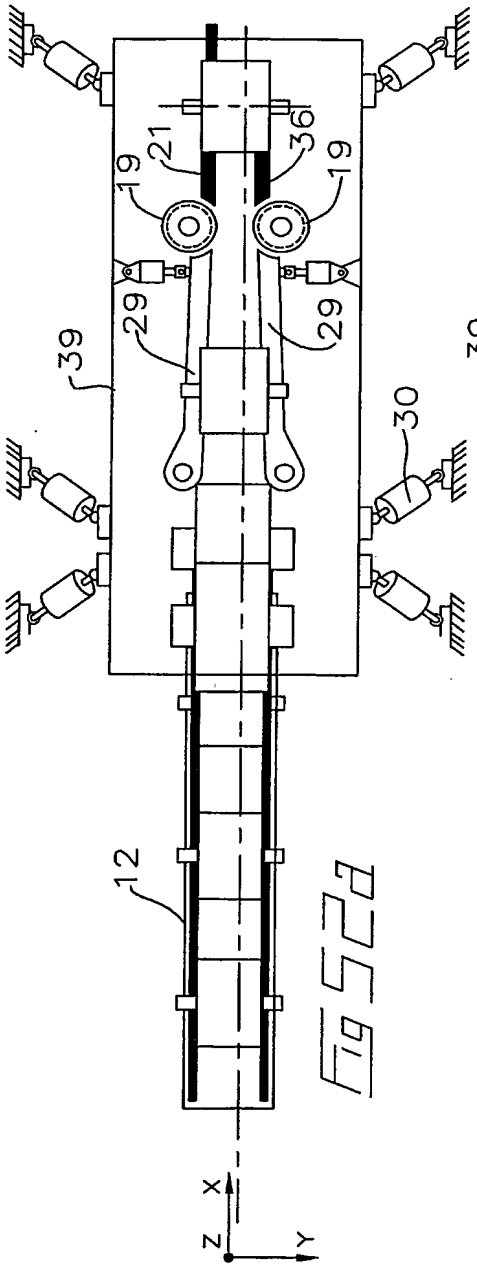


Fig 52a

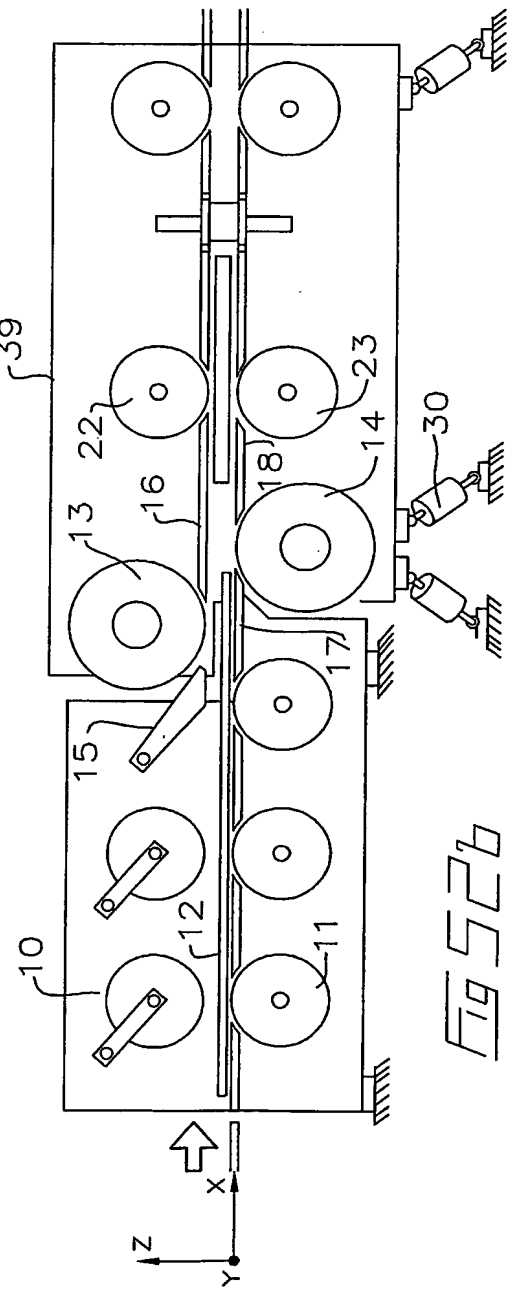


Fig 52b

OPTIMIZING PLANER WITH SIX AXIS OUTFEED POSITIONING MODULE AND INTERMEDIATE SIDE STEERING MODULE

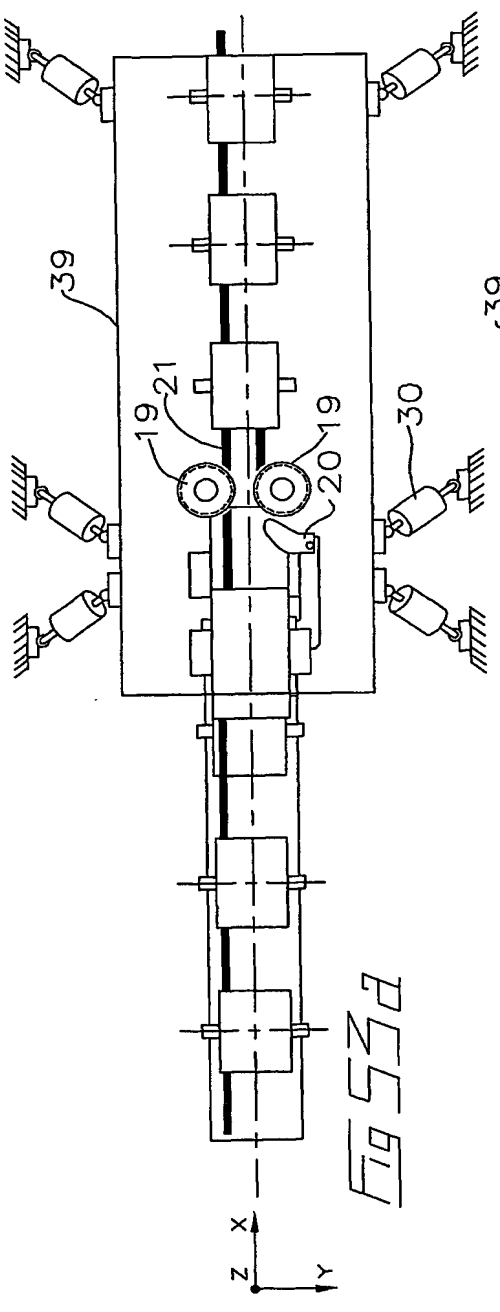


Fig 53a

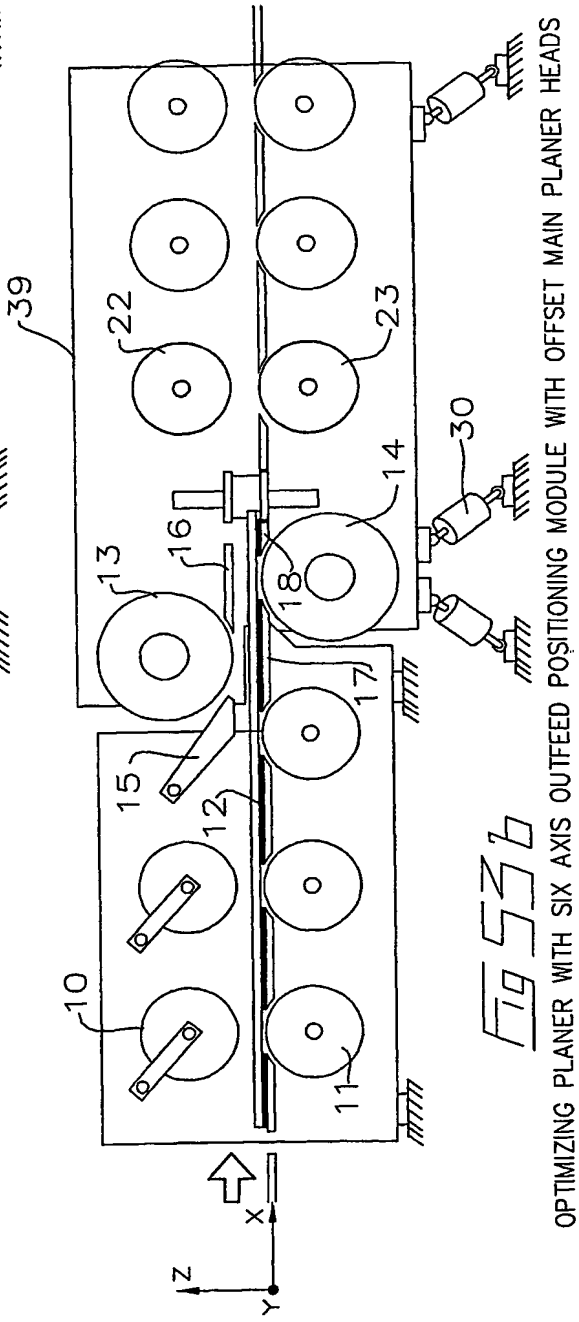
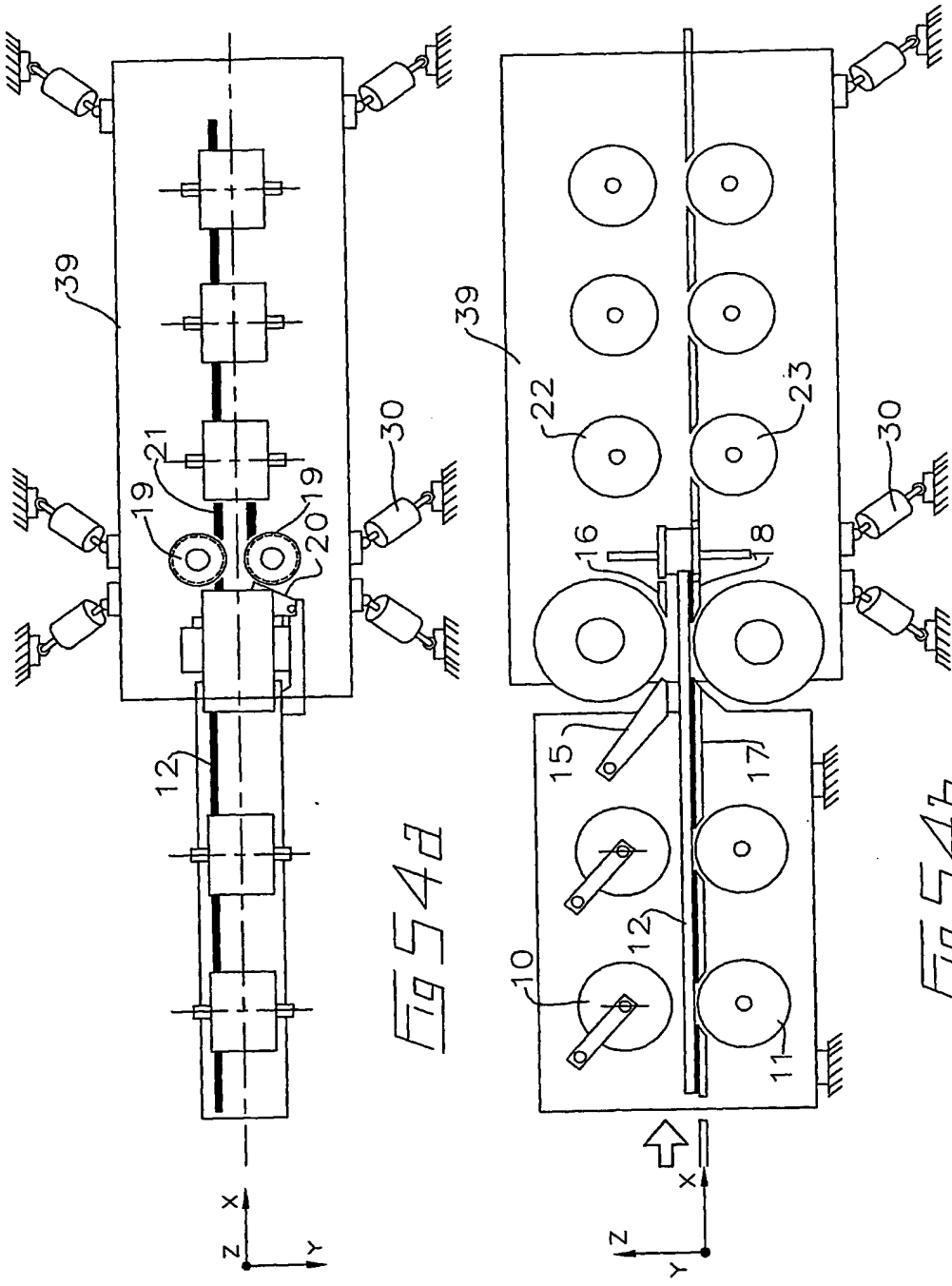


Fig 53b

OPTIMIZING PLANER WITH SIX AXIS OUTFEED POSITIONING MODULE WITH OFFSET MAIN PLANER HEADS



OPTIMIZING PLANER WITH SIX AXIS OUTFEED POSITIONING MODULE WITH INLINE MAIN PLANER HEADS

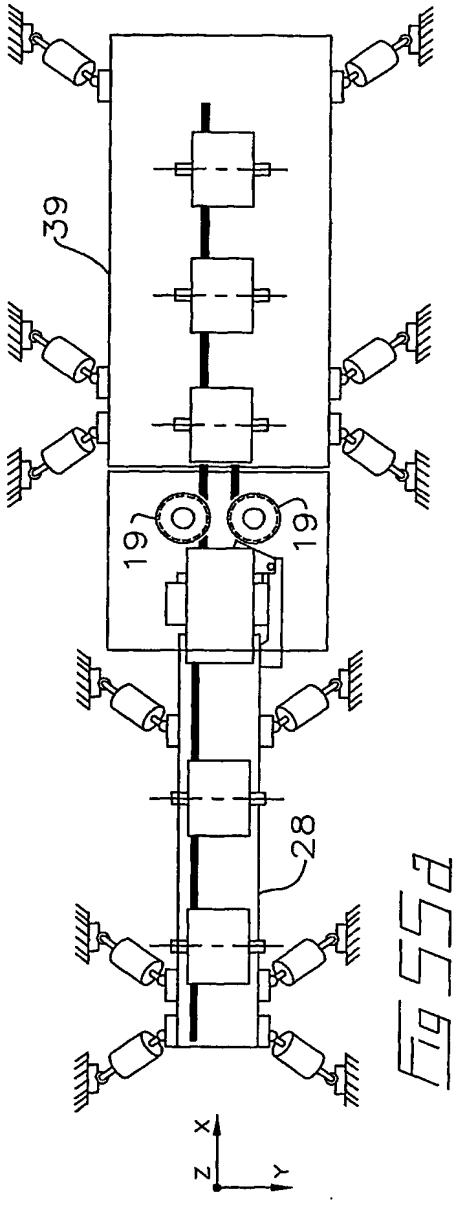


Fig 55a

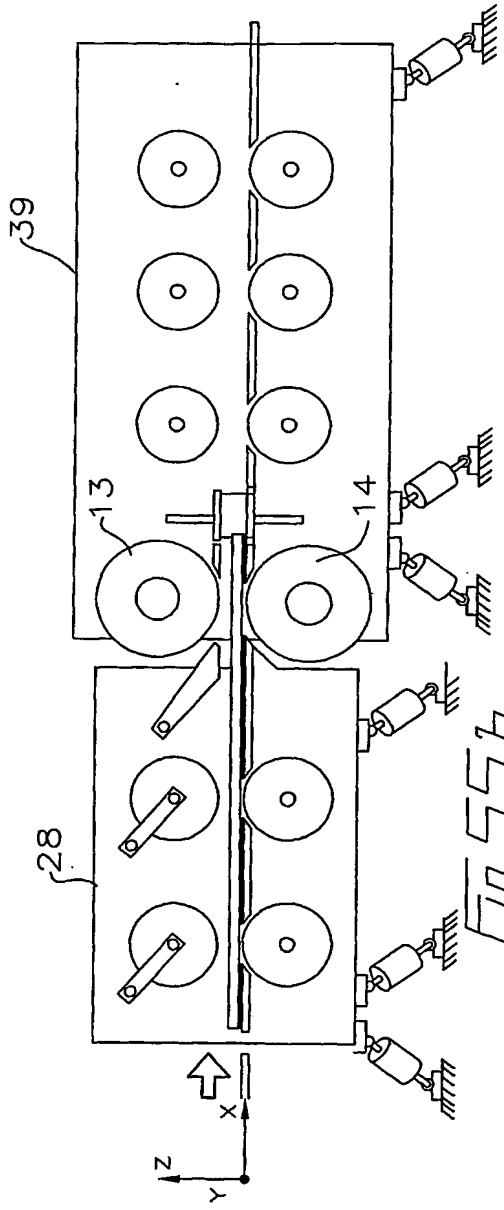


Fig 55b

OPTIMIZING PLANER WITH SIX AXIS INFEED AND OUTFEED POSITIONING MODULES (HEADS MOVING WITH OUTFEED)

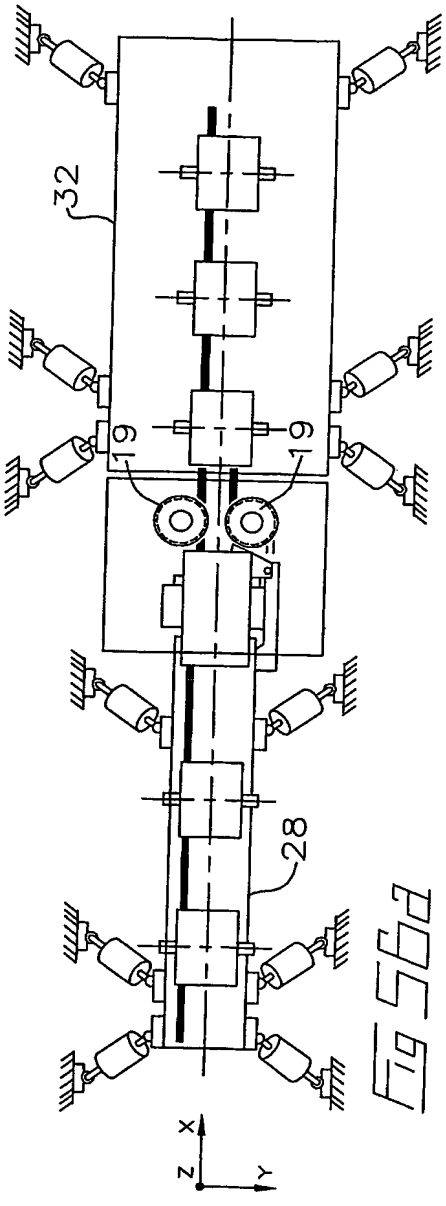


Fig 56a

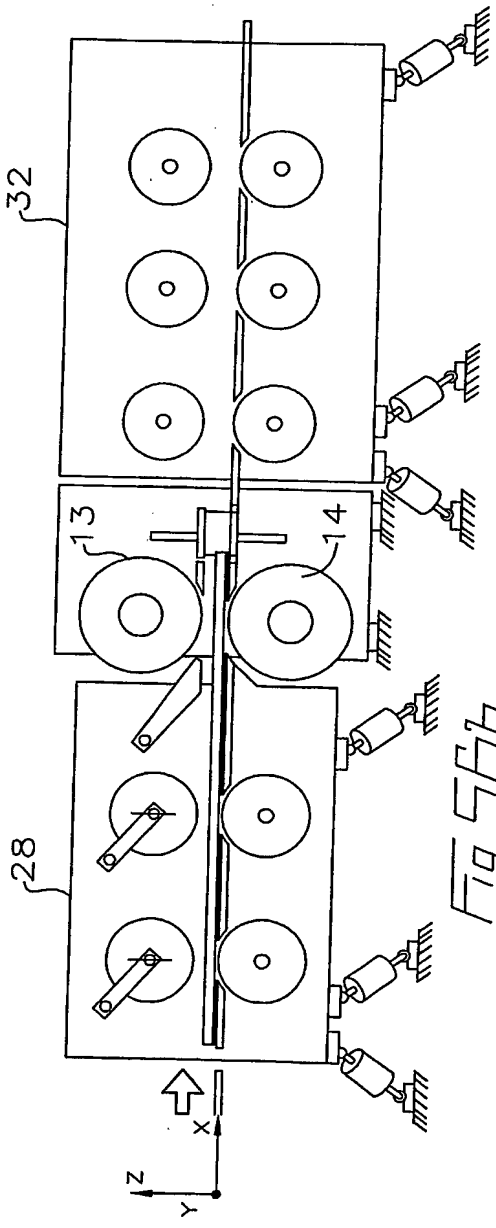


Fig 56b

OPTIMIZING PLANER WITH SIX AXIS INFEED AND OUTFEED POSITIONING MODULES (STATIONARY HEADS)

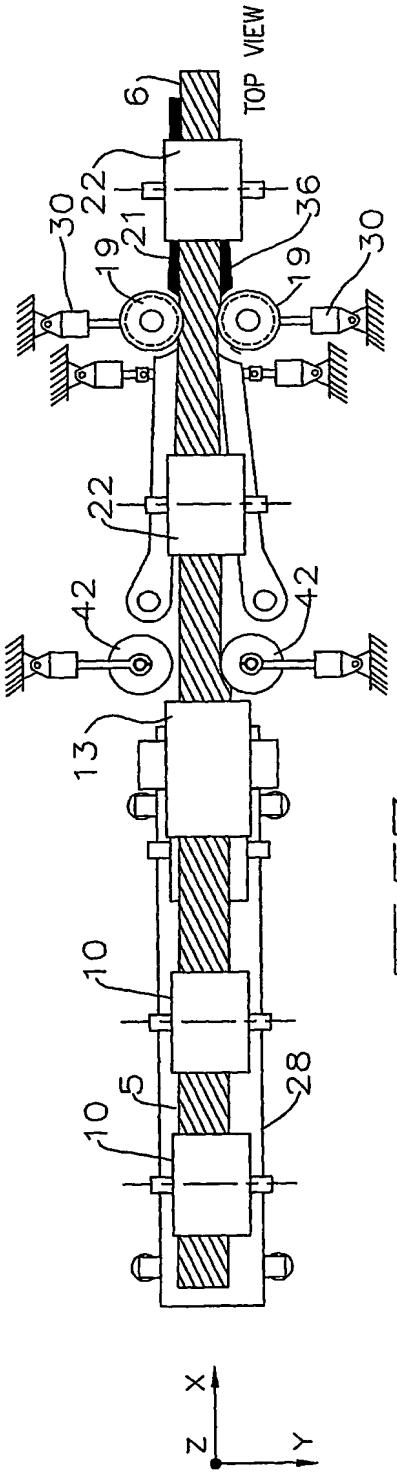


Fig 57

OPTIMIZING PLANER-OPTIONAL SIDE PRE-CUT
(TO REDUCE WORK PIECE TO A SMALLER NOMINAL SIZE)

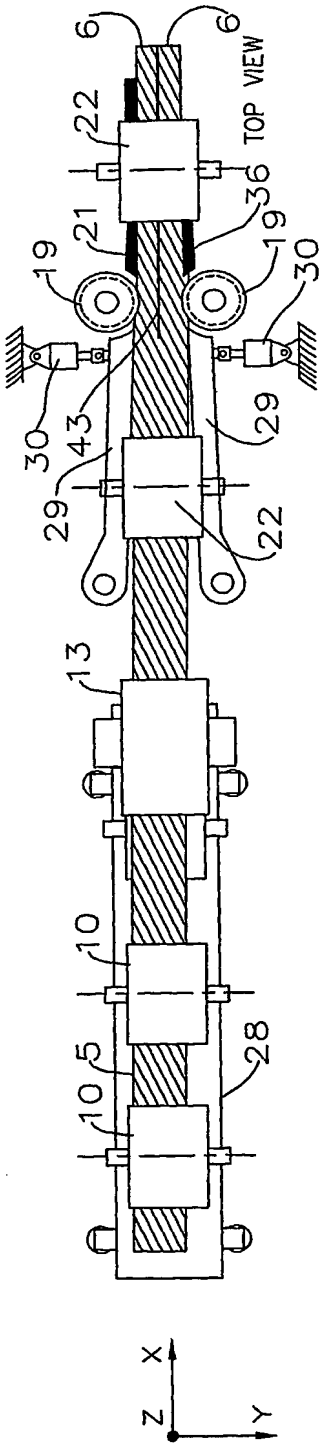


Fig 58

OPTIMIZING PLANER-OPTIONAL INTERIOR PROFILING
(TO SPLIT SINGLE WORK PIECE INTO TWO PIECES)

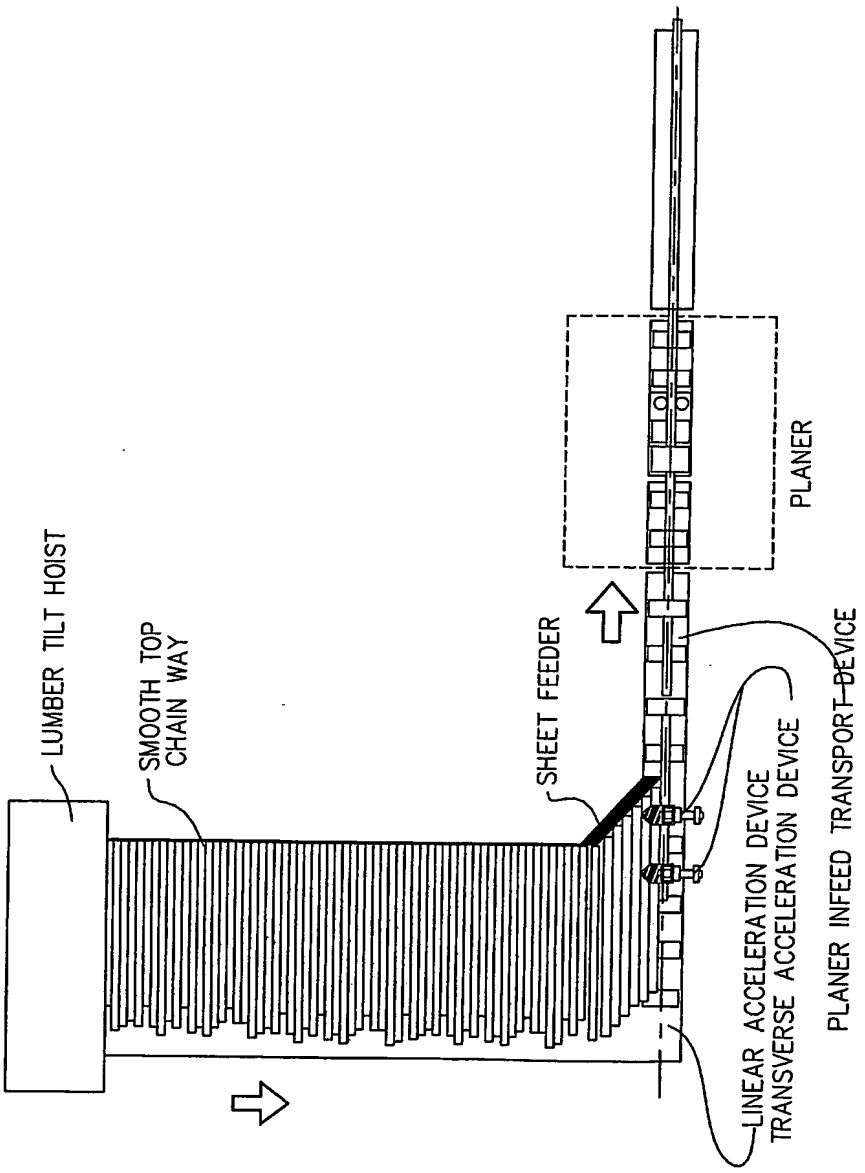


Fig 54

CONVENTIONAL PLANER INFEED SYSTEM–SHORT INFEED TRANSPORT DEVICE
(BEFORE CONVERSION TO OPTIMIZED SYSTEM)

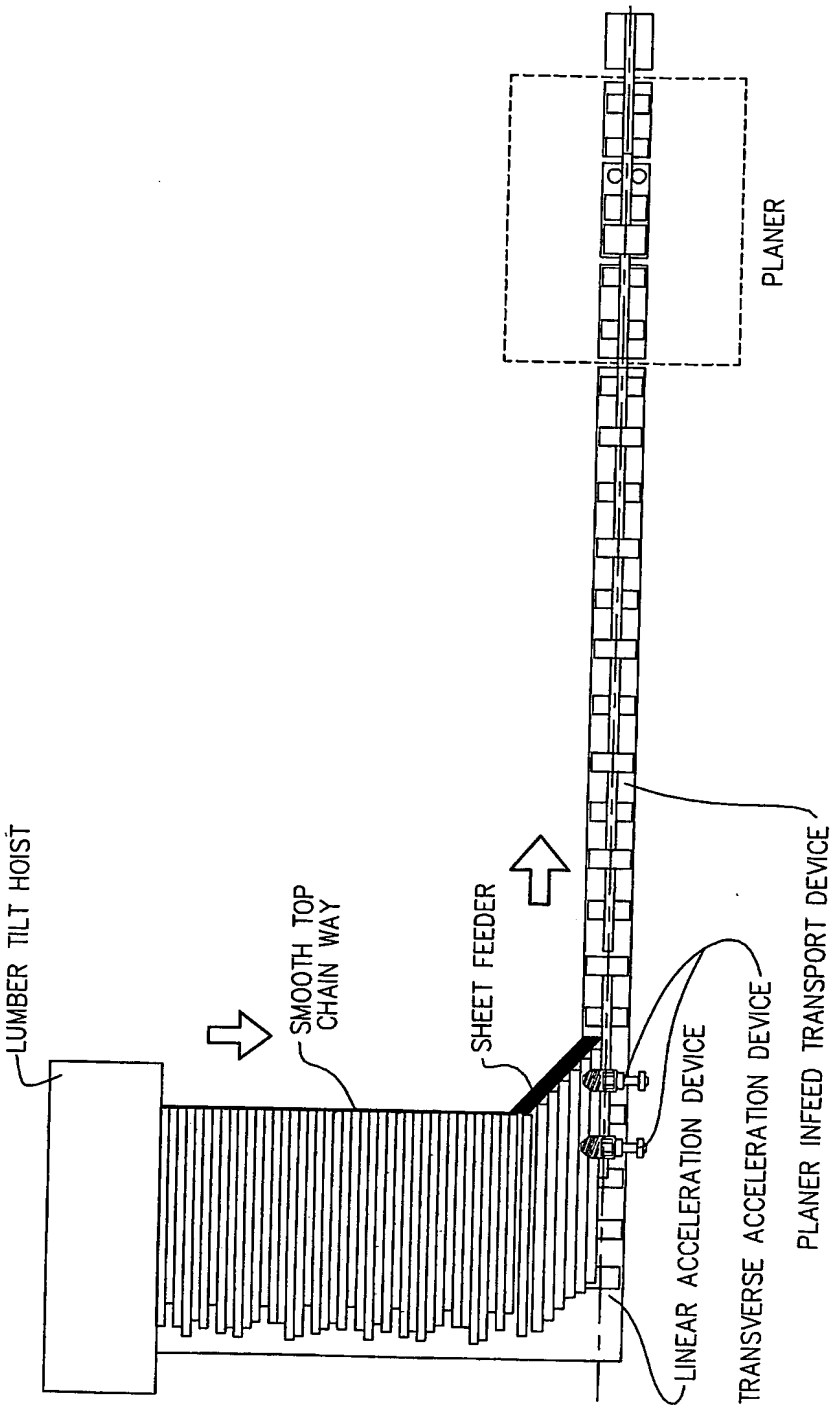


Fig 60

CONVENTIONAL PLANER INFEED SYSTEM–LONG INFEED TRANSPORT DEVICE
(BEFORE CONVERSION TO OPTIMIZED SYSTEM)

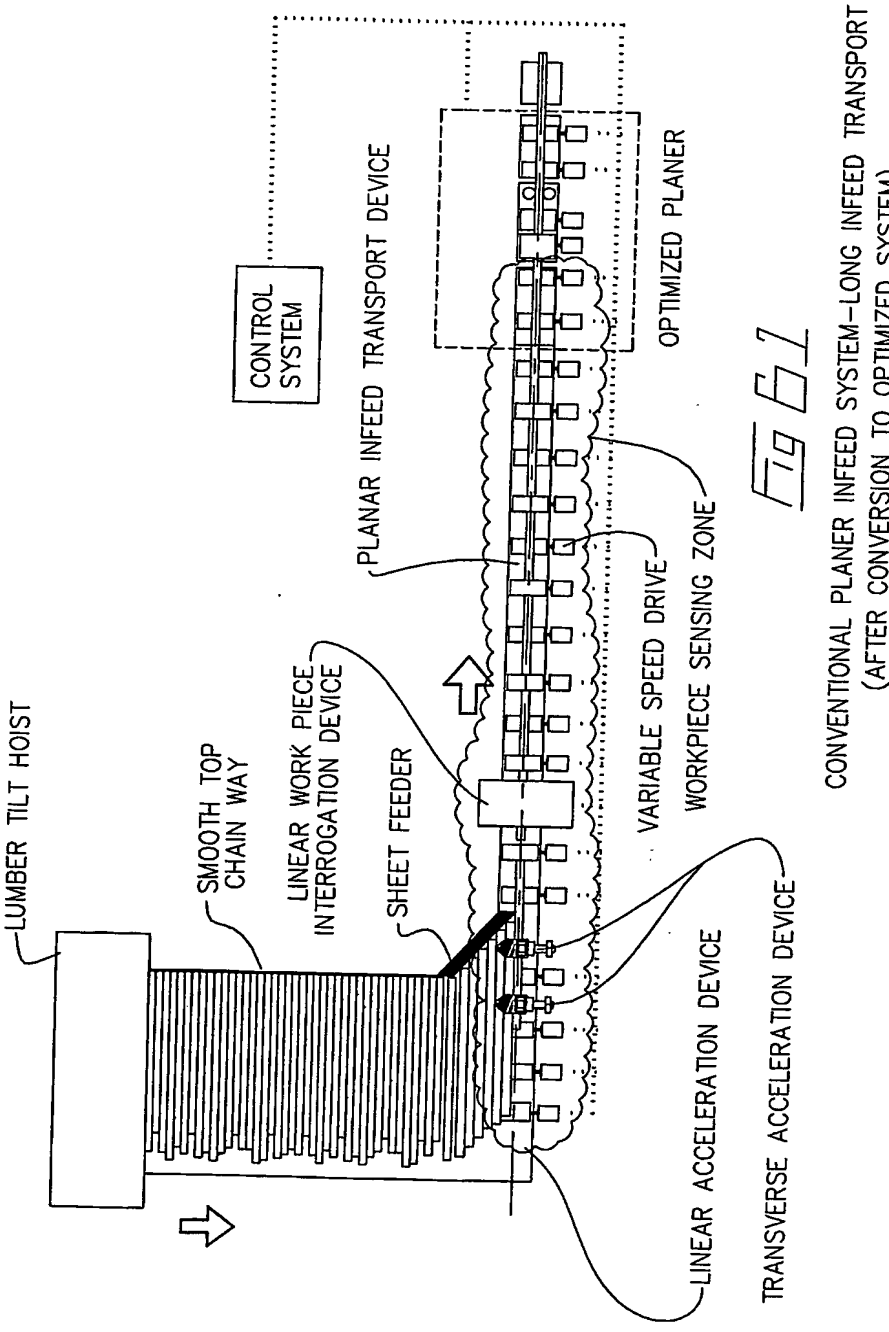


Fig 61

CONVENTIONAL PLANER INFEED SYSTEM–LONG INFEED TRANSPORT DEVICE
(AFTER CONVERSION TO OPTIMIZED SYSTEM)

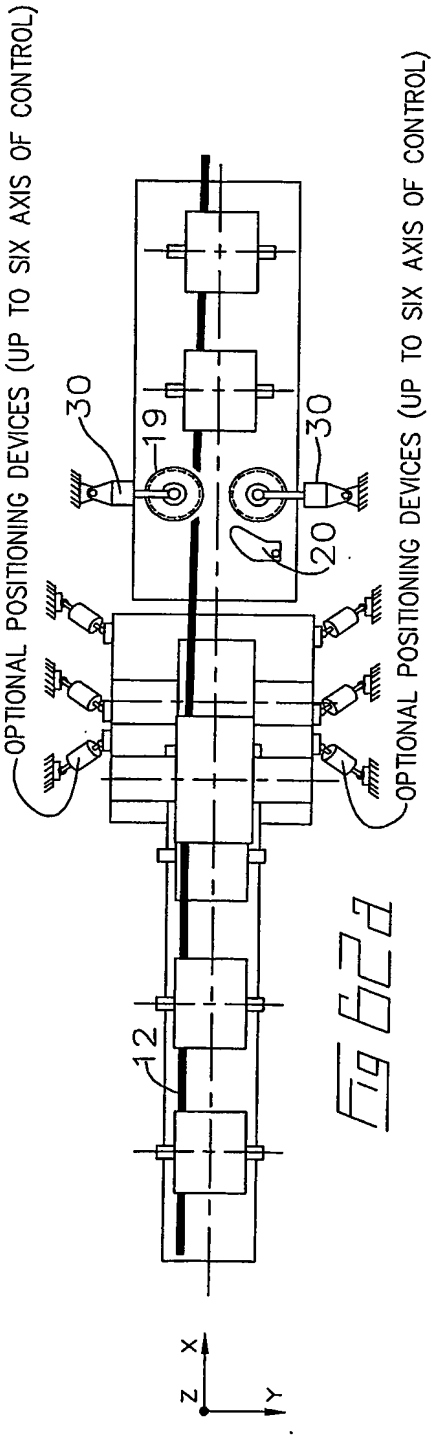


Fig 6Ca

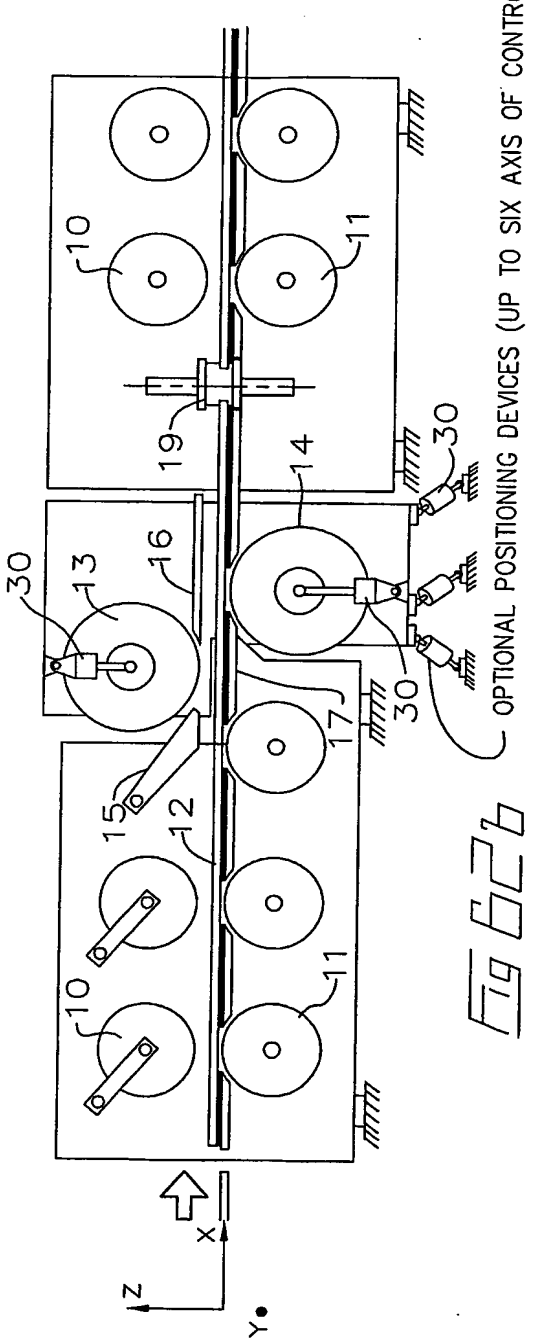


Fig 6Cb

OPTIMIZING PLANER WITH MOVABLE CUTTING ELEMENTS AND OFFSET MAIN PLANER HEADS